RECONNAISSANCE FLORA & VEGETATION ASSESSMENT

Jinbi Project

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Yindjibarndi Energy Corporation

Date

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BoM:	Bureau of Meteorology
DBCA:	Department of Biodiversity, Conservations and Attractions
DCCEEW:	Department of Climate Change, Energy, the Environment and Water
DPIRD:	Department of Primary Industries and Regional Development
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
IBSA:	Index of Biodiversity Surveys for Assessment
Mattiske Consulting:	Mattiske Consulting Pty Ltd
NVIS:	National Vegetation Information System
PEC:	Priority Ecological Community
PRIMER:	Plymouth Routines in Multivariate Ecological Research
Riparian Flora and Plant Communities PEC:	Riparian Flora and Plant Communities of Springs and River Pools with High Water Permanence of the Pilbara Region PEC
SIMPER:	Similarity Percentages
SIMPROF:	Similarity Profile
Survey areas:	Refers to the Jinbi Project Area and Broader Investigation Areas, collectively
TEC:	Threatened Ecological Community
WAH:	Western Australian Herbarium (PERTH)
YEC:	Yindjibarndi Energy Corporation

EXECUTIVE SUMMARY

The Yindjibarndi Energy Corporation proposes to develop a solar farm, the Jinbi Project, approximately 55 km south of Karratha within the Yindjibarndi Native Title Determination Area. The Yindjibarndi Energy Corporation is a partnership between the Yindjibarndi Aboriginal Corporation and renewable energy company, ACEN Corporation. The Yindjibarndi Native Title Determination Areas are located within the northern Pilbara region of Western Australia, and encompass Karratha and Millstream Chichester National Park. The Jinbi Project Area occupies 1606.75 ha, and is situated within a Broader Investigation Area occupying approximately 100,535 ha.

Mattiske Consulting Pty Ltd were commissioned by the Yindjibarndi Energy Corporation in September 2023 to undertake a desktop flora and vegetation assessment of both the Jinbi Project (previously referred to as the Pilot Plant Survey Area) and the Broader Investigation Area to identify any conservation significant flora or vegetation communities potentially present. The results of the desktop assessment informed this November 2023 reconnaissance flora and vegetation survey of the Jinbi Project Area and broader level survey of the Broader Investigation Area.

A total of 177 vascular plant taxa which are representative of 110 genera and 44 families were recorded across the Jinbi Project Area and Broader Investigation Area. The majority of taxa recorded were representative of the Fabaceae (67 taxa), Poaceae (33 taxa) and Myrtaceae (9 taxa) families. Within the Jinbi Project Area 121 vascular plant taxa were recorded, representing 81 genera and 34 families. One priority 2 taxon, *Pentalepis trichodesmoides* subsp. *hispida* (P2), was recorded growing on disturbed ground, at the edge of a vehicle track, in the east of the Jinbi Project Area. *Pentalepis trichodesmoides* subsp. *hispida* (P2) is known from 14 records across the Pilbara, five of which are protected within National Parks.

The vegetation communities defined within the Jinbi Project Area were consistent with the information recorded in the desktop assessment. The majority of the Jinbi Project Area consisted of *Triodia* grasslands with emergent *Corymbia* and *Acacia* shrublands on either granitic or sandstone derived substrates. These areas were intersected by ephemeral creeks supporting *Eucalyptus victrix* woodlands with *Melaleuca glomerata* and *Melaleuca linophylla* shrublands. One restricted vegetation type was recorded in the centre of the Jinbi Project area, surrounding a permanent Jinbi (spring). Vegetation in this area supported groundwater dependent *Melaleuca argentea* woodlands with *Typha domingensis* and *Schoenoplectus subulatus* thickets in the understorey. This vegetation (C2) is considered likely to represent the Riparian Flora and Plant Communities of Springs and River Pools with High Water Permanence of the Pilbara Region Priority Ecological Community (P2).

Seven other Priority Ecological Communities (in addition to the Riparian Flora and Plant Communities PEC (P3)) were identified during the desktop assessment of the Jinbi Project Area and Broader Investigation Area – all of which had a low likelihood of occurring within the Jinbi Project Area. Quadrat-based reference data for these seven other Priority Ecological Communities was not available for comparison with the quadrat data collected here, but the majority of the key indicator species used to define these Priority Ecological Communities (i.e., *Sorghum* spp., *Astrebla* spp., *Acacia xiphophylla*) were absent from the Jinbi Project Area. Key geologic and pedologic features of these seven Priority Ecological Communities (i.e., self-mulching clays, cracking clays, gilgaied clays) were also absent from the Jinbi Project Area. The combination of the absence of almost all key features (plant taxa, soil, and geology) used to define these seven Priority Ecological Communities from the Jinbi Project Area, and the adequate quadrat density and foot traverse intensity, makes it unlikely for these Priority Ecological Communities to occur within the Jinbi Project Area. This conclusion is not considered to have been impacted by the poor seasonal timing of the reconnaissance survey, given that the indicator species used to define these Priority Ecological Communities are mostly perennial, identified only to genus, or defined by abiotic factors (soil, geology).

Within the Broader Investigation Areas, vegetation was also consistent with that recorded in the desktop assessment, and of the region more broadly. Vegetation likely representing the Cracking clays of the Chichester and Mungaroona Range Priority Ecological Community (P1) was recorded near Ngurrawaana, in the centre of the Broader Investigation Area (external to the Jinbi Project Area), although the poor timing of the survey meant that most taxa had senesced. If the Yindjibarndi Energy Corporation proposes to develop any part of the Broader Investigation Area (i.e., outside of the Jinbi Project Area), further survey work in the recommended March-June period will be required.

In December 2023, approximately one month after the field survey, the entirety of the Jinbi Project Area was burnt by wildfire. The suite of species that regenerate in the first year after fire often constitute a much different vegetation structure to those present in mature vegetation. At the time of writing, the region had received less than 5 mm of rainfall since the December 2023 fire and post-fire vegetation regrowth within the Jinbi Project Area is therefore likely sparse, immature and/or sterile. Until such time that the region has received adequate cyclonic rainfall, any follow-up or detailed vegetation surveys of the Jinbi Project Area, especially in 2024, are unlikely to improve on the flora and vegetation survey work presented here.

1. INTRODUCTION

The Yindjibarndi Energy Corporation (YEC) proposes to develop a solar farm, the Jinbi Project, approximately 55 km south of Karratha within the Yindjibarndi Native Title Determination Area. The Yindjibarndi Energy Corporation is a partnership between the Yindjibarndi Aboriginal Corporation and renewable energy company, ACEN Corporation.

1.1 Location and Scope of Project

The Yindjibarndi Native Title Determination Areas are located within the northern Pilbara region of Western Australia, and encompass Karratha and Millstream Chichester National Park (Figure 1). The YEC propose to develop the Jinbi Project approximately 55 km south of Karratha, near the north-western extent of the Millstream Chichester National Park (Figure 1). The Jinbi Project Area occupies 1606.75 ha, and is situated within a Broader Investigation Area occupying approximately 100,535 ha (Figure 1). The Broader Investigation Area represent the area surveyed to contextualise the flora and vegetation recorded within the Jinbi Project Area.

Mattiske Consulting Pty Ltd (Mattiske Consulting) were commissioned by the YEC in September 2023 to undertake a desktop survey of both the Jinbi Project Area (previously referred to as the Pilot Plant Survey Area) and the Broader Investigation Area to identify any conservation significant flora or vegetation communities potentially present (Mattiske Consulting 2023). For brevity, the Jinbi Project Area and the Broader Investigation Areas are referred to collectively hereinafter as the survey areas. The results of this desktop assessment informed this reconnaissance flora and vegetation survey of the Jinbi Project area and broader level survey of the Broader Investigation Areas in November 2023.

1.2 Environmental Legislation and Guidelines

The following key Commonwealth (federal) legislation relevant to this survey is the:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

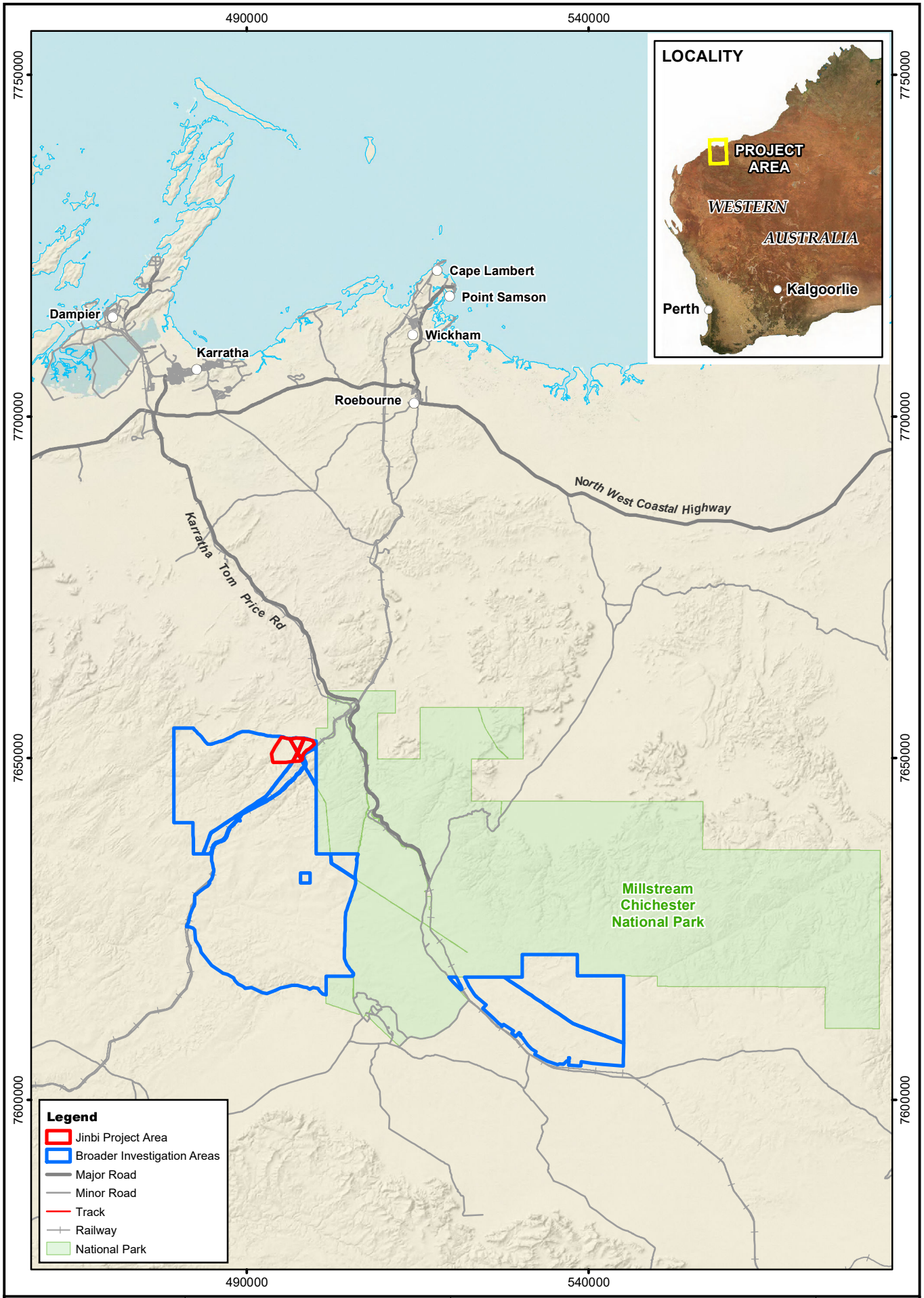
The following key Western Australian (state) legislation relevant to this survey include the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act);
- *Environmental Protection Act 1986* (EP Act); and
- *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*

Furthermore, key Western Australian guidelines relevant to this survey are the:

- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* ((Environmental Protection Authority [EPA] 2016a); and
- *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b)

Definitions of flora and vegetation terminology commonly used throughout this report are set out in Appendices A1 – A6.



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Date: October 2023 | Rev: A | A4

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Yindjibarndi Energy Corporation
Yindjibarndi Renewable Energy Project
Locality

Figure: 1

2. OBJECTIVES

The aim of this assessment was to undertake a reconnaissance flora and vegetation survey of the Jinbi Project Area, and describe the vegetation therein. Broader level assessments of the conservation significant flora and communities identified by Mattiske Consulting (2023) within the Broader Investigation Areas were also undertaken. Specifically, the objectives include:

- Review the conservation significant flora and ecological communities identified as potentially occurring within the survey areas by the desktop assessment (Mattiske Consulting 2023);
- Undertake a reconnaissance flora and vegetation survey of the Jinbi Project Area;
- Undertake broader level surveys of the conservation significant flora and ecological communities present within the Broader Investigation Areas to contextualize the flora and vegetation recorded within the Jinbi Project Area;
- Collect and identify the vascular plant species present within vegetation survey quadrats, relevés, as well as opportunistically, within the survey areas;
- Record visual observations of the fire regimes, grazing pressures and overall health of the vegetation to allow for an assessment of the overall condition of the flora and vegetation within the survey areas;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (DBCA), and listed by the Department of Climate Change, Energy, the Environment and Water (DCCEEW 2023a) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Undertake a statistical analysis of the quadrat-based data recorded within the Jinbi Project Area to assist with vegetation community delineation; and
- Prepare a report detailing the findings.

3. METHODS

The reconnaissance flora and vegetation survey was completed to the standards set out in *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a) and *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b). The Jinbi Project Area and Broader Investigation Areas were supplied to Mattiske Consulting by Coterra Environment as shapefiles.

3.1 Field Survey

The reconnaissance flora and vegetation assessment of the Jinbi Project Area was undertaken by one senior and one experienced botanist from Mattiske Consulting, both of whom were familiar with the local flora, between the 30th October - 3rd November 2023. Both botanists held valid collection licenses to collect flora for scientific purposes, issued under Regulation 62 of the *Biodiversity Conservation Regulations 2018*, and one held a valid permit to take Declared Rare Flora, issued under Section 40 of the BC Act.

Vegetation quadrats were established as appropriate to sample the vegetation communities present. Vegetation quadrat locations were initially selected using aerial imagery, with modification and additions being made in the field. All vegetation survey quadrats measured 50 m x 50 m in size. In situations where vegetation community shape (e.g., drainage channels) precluded establishing quadrats of the standard dimension, an area of equivalent size (i.e., 2,500 m^2) was surveyed. The flora and vegetation were sampled and described systematically at each vegetation survey quadrat, and additional opportunistic collecting was undertaken wherever previously unrecorded plants were observed. At each vegetation survey quadrat, the following floristic and environmental parameters were recorded:

- GPS location (GDA94 datum);
- photograph of the vegetation from the north-west corner of quadrat facing south-east;
- soil type, colour and any additional observations;

- local site topography;
- presence of any outcropping rocks and their type;
- aspect of the hill-slopes;
- percentage of litter cover (logs, twigs and/or leaves);
- percentage of bare ground;
- time since fire;
- condition of the vegetation, based on Trudgen's (1988) condition ratings for the Eremaean and Northern botanical provinces (Appendix A5); and
- alive and dead percentage of foliage cover and average height of each species recorded.

All plant specimens collected during the field survey were dried and processed in accordance with the requirements of the Western Australian Herbarium (WAH). All plant specimens were identified through comparisons with pressed specimens housed at the Mattiske Consulting herbarium and WAH. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

One approximately three-hour information sharing session was held with six Yindjibarndi traditional owners on the 31st October 2023. The traditional owners present were Lorraine Coppin, Wendy Hubert, Mary Watson, Judith Coppin, Danelle Ranger and Sadina (surname unknown). Botanists met with the traditional owners at the Jinbi (spring) in the centre of the Jinbi Project Area where Yindjibarndi and scientific plant names were exchanged. Additionally, the traditional owners shared their traditional uses (food, tools, jami etc.) for several taxa growing in and around the Jinbi, as well as stories associated with specific taxa. Knowledge of the traditional burning practices, pre-European mammal ecology, Yindjibarndi-European relationships, and ongoing environmental management issues were also discussed, to be incorporated in botanists' interpretation and understanding of the flora and vegetation of the region.

3.1 Statistical Analysis of Quadrat Data and Vegetation Mapping

A species accumulation curve, based on accumulated species versus number of quadrats surveyed was prepared, to evaluate the level of adequacy of the survey effort. The species accumulation curve was based on the species accumulation analysis of Colwell (2013).

Plymouth Routines in Multivariate Ecological Research version 7 (PRIMER v7) statistical analysis software was used to analyse species-by-site data and discriminate sites on the basis of their species composition (Clarke and Gorley 2015). Cluster analyses derived from a species-by-site resemblance matrix (Bray-Curtis similarity) grouped survey sites into discrete clusters based on species composition (dissimilarity/distance increased) (Clarke and Gorley 2015). To down weight the relative contributions of quantitatively dominant species a square root transformation of the data was used for statistical analysis. Only taxa which could be identified to species level were included in the analysis. Classification and ordination analyses were based on a data matrix of perennial taxa, with singularly occurring species and annual taxa omitted prior to analysis. This was justified on the basis that singleton taxa add little additional information, and annuals exhibit high inter-annual variation in distribution and abundance (Mott 1972, 1973). In addition, the omission of annual species from the statistical analysis allows for the future comparison of data from surveys undertaken in different seasons or survey years. Hierarchical Clustering was used in conjunction with Similarity Profile (SIMPROF), Similarity Percentages (SIMPER), site descriptions, site photos and aerial photography to increase the understanding of site inter-relations and inform the delineation of vegetation community boundaries.

3.2 Vegetation Descriptions

Vegetation descriptions were based on Aplin's (1979) modification of the vegetation classification system of Specht (1970), to align with the National Vegetation Information System (NVIS). Vegetation communities were described at the association level of the NVIS classification framework, as defined by the NVIS Technical Working Group (2017) (Appendix A6).

3.3 Index of Biodiversity Surveys for Assessment

The flora and vegetation survey data and report were compiled into an Index of Biodiversity Surveys for Assessment (IBSA) package in accordance with the instructions for preparing packages for the IBSA (EPA 2023), and submitted via the IBSA portal.

4. FIELD SURVEY RESULTS

The reconnaissance flora and vegetation survey of the Jinbi Project Area was completed between the 30th October and 3rd November 2023. A total of 35 vegetation survey sites (quadrats and relevés) were established throughout the survey areas to sample the vegetation present. Due to time constraints, the disjunct southeastern broader investigation area (Figure 1) was not surveyed. Instead, field time was focussed on areas closer to the Jinbi Project Area.

4.1 Climate

Beard (1990) describes the climate of the Fortescue Botanical District as arid-tropical with summer rain, receiving 250-300 mm annually. Rainfall variability is largely driven by the occurrence of cyclones between November and April, which contribute to the Pilbara receiving slightly more rainfall than the surrounding regions (Beard 1990, Bureau of Meteorology [BoM] 2023). Rainfall data from Millstream (station number 5012) and temperature data from Roebourne Aero (station number 4090) are illustrated in Figure 2. Rainfall data was not recorded at Millstream for October or November, but was substituted here for rainfall data from Roebourne Aero.

During the 2023 summer wet season rainfall was approximately 165% of the long-term average for the corresponding period. Rainfall in the three months prior to the November 2023 field survey was approximately 6.5% of the long-term average for the corresponding period (Figure 2, BoM 2023).

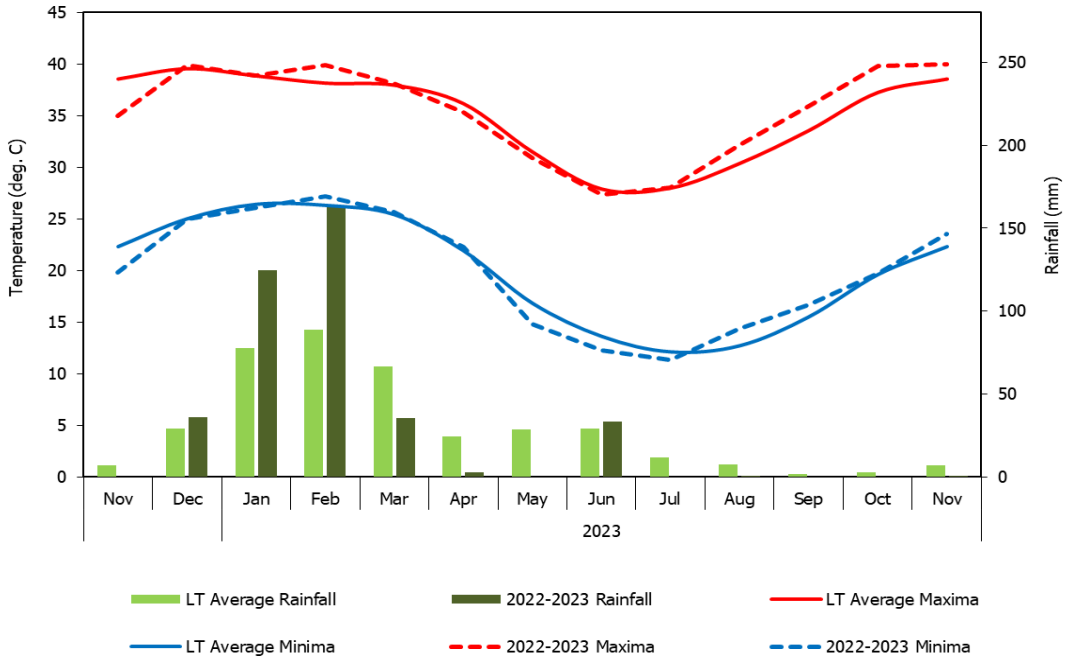


Figure 2: Rainfall and temperature data for Millstream and Roebourne Aero, respectively (BOM Stations 5012 and 4090 respectively) (BoM 2023).
LT – Long-term

4.2 Field Survey Coverage and Limitations

The coverage of the survey areas, based on survey quadrat locations, tracks and foot traverses is illustrated in Figure 3. A total of 35 vegetation survey sites were assessed across the survey areas to describe the vegetation present (Table 1). Access to the Jinbi Project Area was via powerline easement tracks which bisected the area from north to south and from east to west. Access throughout the Broader Investigation Areas was via main roads and railway access tracks. Due to time constraints, the southeastern Broader Investigation Area polygon was not surveyed here. The geographical coordinates of the north-west corner of the survey quadrats established within the survey areas, and the type of survey sites they represent, are set out in Appendix B. In addition to survey quadrats and relevés, additional species were recorded opportunistically.

Table 1: Summary of the vegetation survey sites established throughout the Jinbi Project Area.

Site Type/Survey Area	Jinbi Project Area	Broader Investigation Area	Total
Quadrat	18	11	29
Relevé	3	3	6
Total	21	14	**35**

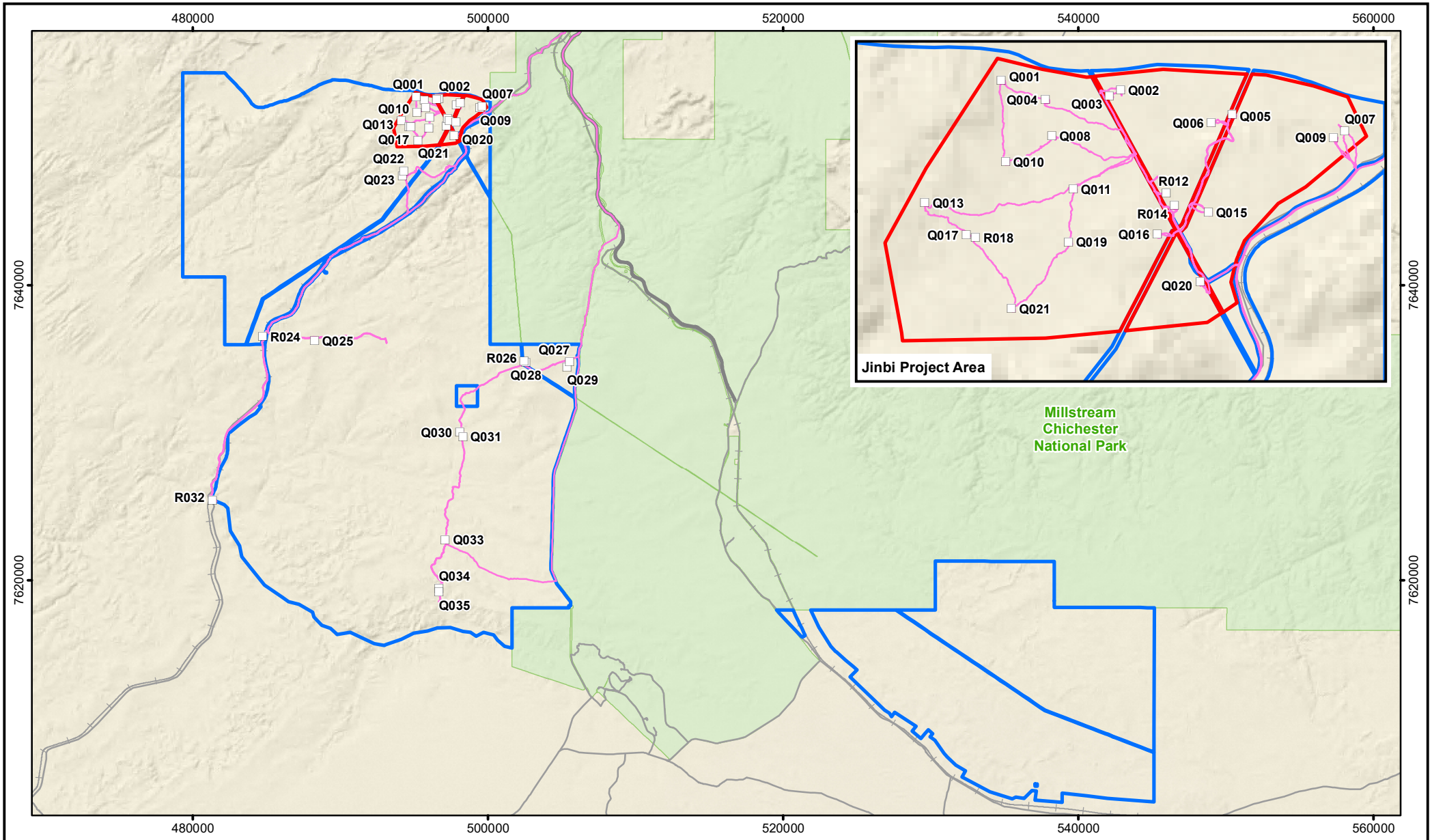
4.3 Field Survey Limitations and Constraints

An assessment of the survey against a range of factors which may have had an impact on the outcomes and conclusions made here is set out in Table 2 below. Based on this assessment, and given the reconnaissance scope of this survey, this survey has not been subject to constraints affecting the thoroughness of the survey and the conclusions which have been formed.

Table 2: Potential flora and vegetation survey limitations.

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (i.e., pre-existing background versus new material).	**Not a constraint.** The desktop assessment for the survey areas was reviewed prior to undertaking the field survey (Mattiske Consulting 2023). This desktop assessment of the flora and vegetation likely to be encountered within the survey areas provided an appropriate level of information for the survey.
Scope (i.e., which life forms, etc., were sampled).	**Not a constraint.** Vascular flora, which was the focus of the present survey, was sampled.
Completeness and further work which might be needed (i.e., was the survey area fully surveyed).	**Constraint**. The scope of this survey was to undertake a reconnaissance flora and vegetation survey of the Jinbi Project Area, and a broader search of the Broader Investigation Areas further south. Due to time constraints, the southeastern portion of the Broader Investigation Area was not surveyed here, although the YEC does not plan on utilizing this area in the foreseeable future (Coterra Environment pers. comm.). The survey work undertaken here is considered to have fulfilled the reconnaissance scope, however it has not fully described the flora and vegetation, particularly of annual taxa, of the Jinbi Project Area. Fire in December 2023 (approximately one month after this field survey) burnt the entirety of the Jinbi Project Area, and without substantial cyclonic rain, further survey work in 2024 is unlikely to improve on the flora and vegetation work presented here.

Potential Survey Limitation	Impact on Survey
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Potential constraint.** Based on the survey quadrat data, it was estimated that approximately 77% of the potential flora species that may be present were recorded across the Jinbi Project Area (see Section 4.5). Based on the plant specimens collected, approximately 45% of all plants were either flowering, fruiting or had both flowers and fruit. This represents a majority of species present being sterile. This was to be expected given the survey timing. Additionally, both botanists who undertook the survey were familiar with Pilbara flora, and were able to identify many taxa at least to family level, even when sterile. The estimated percentage of potential flora species recorded (77%) was considered adequate for a reconnaissance level survey. The proportion of annual taxa recorded, however, may present a minor constraint given that nine of the 24 conservation significant taxa identified in the desktop assessment were annual taxa (Mattiske Consulting 2023).
Mapping reliability.	**Not a constraint.** The spatial coverage of survey sites within the Jinbi Project Area is considered to be adequate for a reconnaissance level survey. The quality of the aerial photographic maps available for the survey was considered to be excellent. Vegetation was mature and no recently burnt fire scars prohibited the sampling of vegetation.
Timing, weather, season, cycle.	**Minor constraint**. The EPA (2016b) recommends that flora and vegetation surveys in the Eremaean botanical provinces take place 6-8 weeks post wet season (March – June), with supplementary surveys in the dry season (after winter rainfall if available). At Roebourne (approximately 50 km north of the Jinbi Project Area), rainfall in the three months preceding the November 2023 survey was just 6.5% of the long-term average for the corresponding period (Figure 2, BoM 2023). This was evident in that the majority of taxa collected (55%) were sterile. Despite the majority of taxa being sterile, approximately 65% of all specimens collected were still able to be confidently identified to species level. As noted above 45% specimens had flowers, fruit or had both flowers or fruit.
Disturbances (fire, flood, accidental human intervention, etc.).	**Not a constraint**. The Jinbi Project Area exhibited very low levels of disturbance, in terms of human impacts. Vehicle tracks following the powerline easement north-south and east-west through the Jinbi Project Area were mostly excised from the polygon boundaries (Figure 3). These access tracks did, however, stray out of the powerline easement and into the Jinbi Project Area in places. Some minor evidence of grazing was also observed throughout the Jinbi Project Area, particularly in ephemeral creeks, but did not impact botanists' ability to sample flora.
Intensity (in retrospect, was the intensity adequate).	**Not a constraint**. The intensity of the survey effort within the Jinbi Project Area was considered to be adequate for a reconnaissance flora and vegetation survey.
Resources (i.e., were there adequate resources to complete the survey to the required standard).	**Not a constraint**. Resources, in terms of equipment, support and personnel were good.
Access problems (i.e., ability to access the survey area).	**Not a constraint**. Vehicle access to the Jinbi Project Area was via a rail access road to the south, and via powerline easement tracks bisecting the area north-south and east-west. The remainder of the Jinbi Project Area was accessed on foot (Figure 3). Access to the Broader Investigation Area was mainly via rail access tracks and tracks around Ngurrawaana (Figure 3). Large areas of the Broader Investigation Area were not accessible via these tracks, although this did not constrain survey effort given the scope was to survey these areas only at a very broad level.
Experience levels (e.g., degree of expertise in plant identification to taxon level).	**Not a constraint**. The botanists taking part in the survey had extensive experience working in the Pilbara region, and had a high level of familiarity with the local flora.



Legend

- Jinbi Project Area
- Broader Investigation Areas
- Quadrats
- Track and Foot Traverses

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Scale: 1:350,000
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Date: December 2023 | Rev: A | A4

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Yindjibarndi Energy Corporation
Yindjibarndi Renewable Energy Project
Quadrat Locations and Track and Foot Traverses

Figure: **3**

4.4 Flora

A total of 177 vascular plant taxa which are representative of 110 genera and 44 families were recorded across the Jinbi Project Area. The majority of taxa recorded were representative of the Fabaceae (67 taxa), Poaceae (33 taxa) and Myrtaceae (9 taxa) families. Within the Jinbi Project Area 121 vascular plant taxa were recorded, representing 81 genera and 34 families. The taxa recorded within both the Jinbi Project Area and the Broader Investigation Area are set out in Appendix C alongside the Yindjibarndi names for some taxa (Greening Australia 2016). A list of plant taxa recorded at each survey quadrat within the survey areas is set out in Appendix D.

Annual species represented approximately 52% of all recorded plant species within the survey areas. Within the Jinbi Project Area annual species represented approximately 55% of all plant species recorded. The majority (55%) of specimens collected were sterile, with only 16% flowering and 29% fruiting. Given this high proportion of sterile specimens, a number of plant species could not be identified accurately to species level due to the absence of sufficient diagnostic taxonomic characters. In these cases, the species is identified as, for example, *Grevillea* sp.

Some plant specimens collected during the survey were submitted to the WAH for formal identification. A list of Western Australian Herbarium accessions related to formal plant identifications are set out in Table 3.

Table 3: Plant specimens submitted to the WAH for formal identification.

Accession	Collection Number	Taxon	Comment
ACC/10544/E	ZS4549	*Stylidium fluminense*	
	KRT280	*Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)	
	ZS4580	*Triodia pisoliticola* (P2)	Somewhat tentative identification in the absence of the florets. The florets are atypically short for the species.
ACC/10559/E	KRT228	*Triodia epactia*	
	KRT258	*Triodia wiseana*	
	KRT271	*Glinus lotoides*	
	KRT276	*Triodia wiseana*	
	ZS4536	*Dodonaea coriacea*	Abnormal growth (?galling, virus) of male plant.
	ZS4541	*Pentalepis trichodesmoides* subsp. *hispida* (P2)	
	ZS4511	*Euphorbia careyi*	
	ZS4556	*Fimbristylis ferruginea*	
	ZS4557	*Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768)	Note that all names in this genus are applied somewhat tentatively.
	ZS4560	*Acacia pyrifolia* var. *morrisonii*	
	ZS4561	*Triodia brizoides*	
	ZS4564	*Ehretia saligna* var. *saligna*	
	ZS4568	*Triodia wiseana*	

4.5 Proportion of Flora Surveyed

A species accumulation plot based on accumulated species recorded versus sites surveyed within the Jinbi Project Area was used to provide an indication as to the level of adequacy of the survey effort. As the number of survey sites increases, and correspondingly the size of the area surveyed increases, there should be a diminishing number of new species recorded. At some point, the number of new species recorded becomes essentially asymptotic. When the number of new species being recorded for survey effort expended approaches this asymptotic value, the survey effort can be considered to be adequate.

The species accumulation curve (Figure 4), based on the species accumulation analysis of Colwell (2013) was used to evaluate the adequacy of sampling. Species by quadrat data was used in the species accumulation analysis. The asymptotic value was determined using Michaelis-Menten modelling. Based on this analysis, the incidence-based coverage estimator of species richness (Chao 2004) was calculated to be 154. Based on this value, and the total of 121 species recorded across the 21 survey quadrats, approximately 78.6 % of the flora potentially present within the Jinbi Project Area has been recorded.

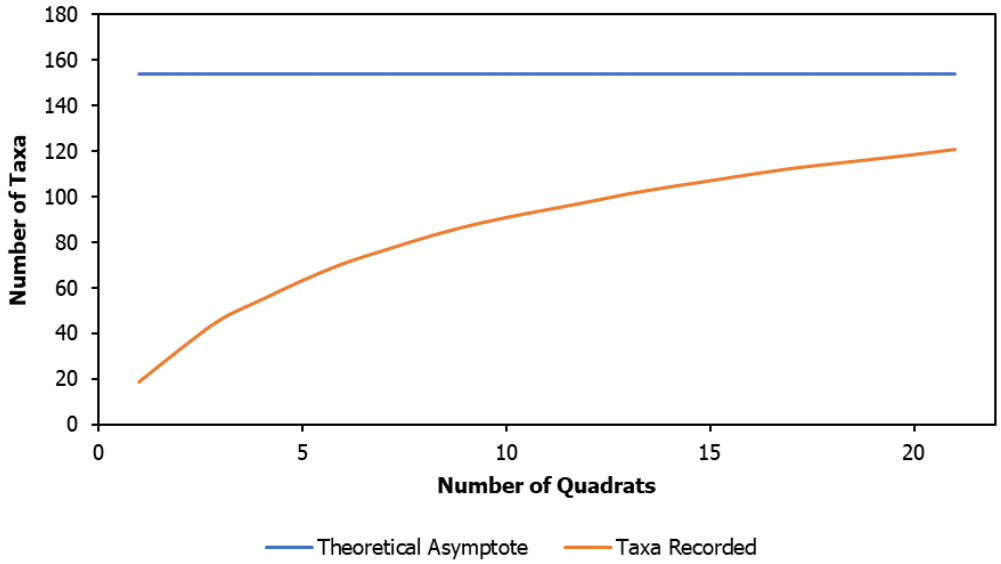


Figure 4: Average randomised species accumulation curve.

4.6 Introduced (Exotic) Plant Species

Four introduced (exotic) plant taxa were recorded within the survey areas. These taxa were:

- **Aerva javanica*
- **Cenchrus ciliaris*
- **Chloris barbata*
- **Parkinsonia aculeata*

Of these taxa, only **Aerva javanica* and **Cenchrus ciliaris* were recorded within the Jinbi Project Area. **Parkinsonia aculeata* is listed as a Declared Pest pursuant to Section 22(2) of the BAM Act. **Parkinsonia aculeata* is a Declared pest for the whole of Western Australia (Department of Primary Industries and Regional Development, [DPIRD] 2023), and is subject to Control Category C3 (management) control measures (Appendix A3). The remaining three taxa are permitted species pursuant to Section 11 of the BAM Act. The locations of all introduced taxa recorded within the survey areas are set out in Table 4.

Table 4: Introduced (exotic) species recorded within the Jinbi Project Area and Broader Investigation Areas.

Taxon	Status (BAM Act 2013)	Survey area	Location (MGA94 zone 50)	
			Easting (m)	Northing (m)
**Aerva javanica*	Permitted – s11	Jinbi Project Area	497724	7650145
**Cenchrus ciliaris*	Permitted – s11		497724	7650145
**Cenchrus ciliaris*	Permitted – s11		497279	7651305
**Cenchrus ciliaris*	Permitted – s11		496538	7652573
**Cenchrus ciliaris*	Permitted – s11		495786	7652052
**Cenchrus ciliaris*	Permitted – s11	Broader Investigation Area	505364	7634448
**Cenchrus ciliaris*	Permitted – s11		498085	7630055
**Cenchrus ciliaris*	Permitted – s11		505529	7634802
**Cenchrus ciliaris*	Permitted – s11		502465	7634838
**Chloris barbata*	Permitted – s11		498085	7630055
**Parkinsonia aculeata*	Declared Pest – s22(2)		481320	7625419

4.7 Vegetation Communities

Following *a priori* analysis of significant groups, vegetation communities were delineated using a combination of the SIMPROF and SIMPER results together with landform, soil data, and associated records of the survey quadrats and relevès. Where appropriate outliers and small groupings were merged into broader vegetation units based on species composition and site descriptions. Based on the statistical analyses, four vegetation communities were defined and mapped across the Jinbi Project Area. The dendrogram representing the results of the cluster analysis, and the corresponding three vegetation communities is illustrated in Figure 5.

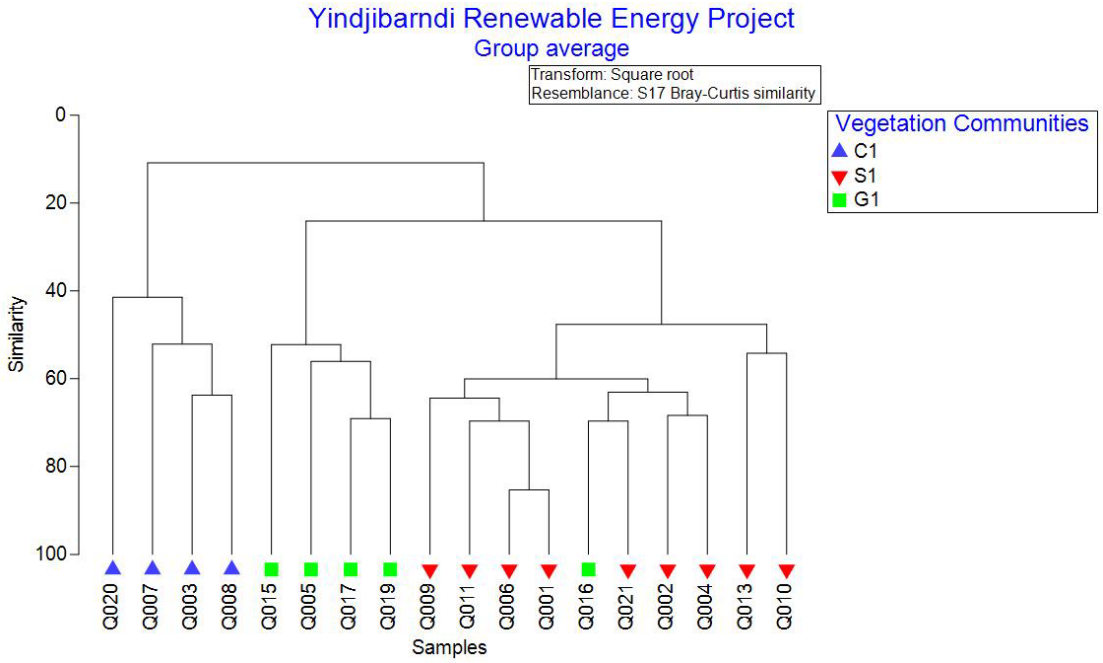


Figure 5: Cluster analysis of species square-root transformed data for quadrats established within the Jinbi Project Area, showing assigned vegetation communities.

The descriptions of the four vegetation communities were based on Aplin's (1979) modification of the vegetation classification system of Specht (1970), to align with the NVIS. Vegetation communities were described at the association level of the NVIS classification framework, as defined by the NVIS Technical

Working Group (2017) (Appendix A6) and are summarised below. The vegetation mapping is presented in Figure 6. The proportion of each vegetation community mapped within the Jinbi Project Area is set out in Table 5. The species recorded within each vegetation community is set out in Appendix E. The vegetation communities are described in Appendix F and are summarised below.

Creeklines

C1: *Eucalyptus victrix* low open woodland over *Melaleuca linophylla, Melaleuca glomerata, Acacia bivenosa* mid sparse shrubland over *Stemodia grossa, Cyperus vaginatus* low sparse shrubland in ephemeral drainage channels.

C2: *Melaleuca argentea, Eucalyptus* ?*camaldulensis* mid woodland over *Acacia ampliceps, Acacia coriacea* subsp. *pendens*, *Acacia pyrifolia* var. *pyrifolia* mid open shrubland over *Typha domingensis, Cyperus vaginatus, Schoenoplectus subulatus* open sedgeland surrounding permanent pools.

Grassland

G1: *Acacia ancistrocarpa, Acacia pyrifolia* var. *pyrifolia, Acacia bivenosa* mid sparse shrubland over *Triodia wiseana*, *Triodia epactia* low hummock grassland on rugged sandstone hilltops.

Shrubland

S1: *Corymbia hamersleyana, Terminalia circumalata* low isolated trees over *Acacia ancistrocarpa, Acacia pyrifolia* var. *pyrifolia, Acacia inaequilatera* mid sparse shrubland over *Triodia epactia, Aristida contorta* low hummock grassland on stony plains and granite tor fields.

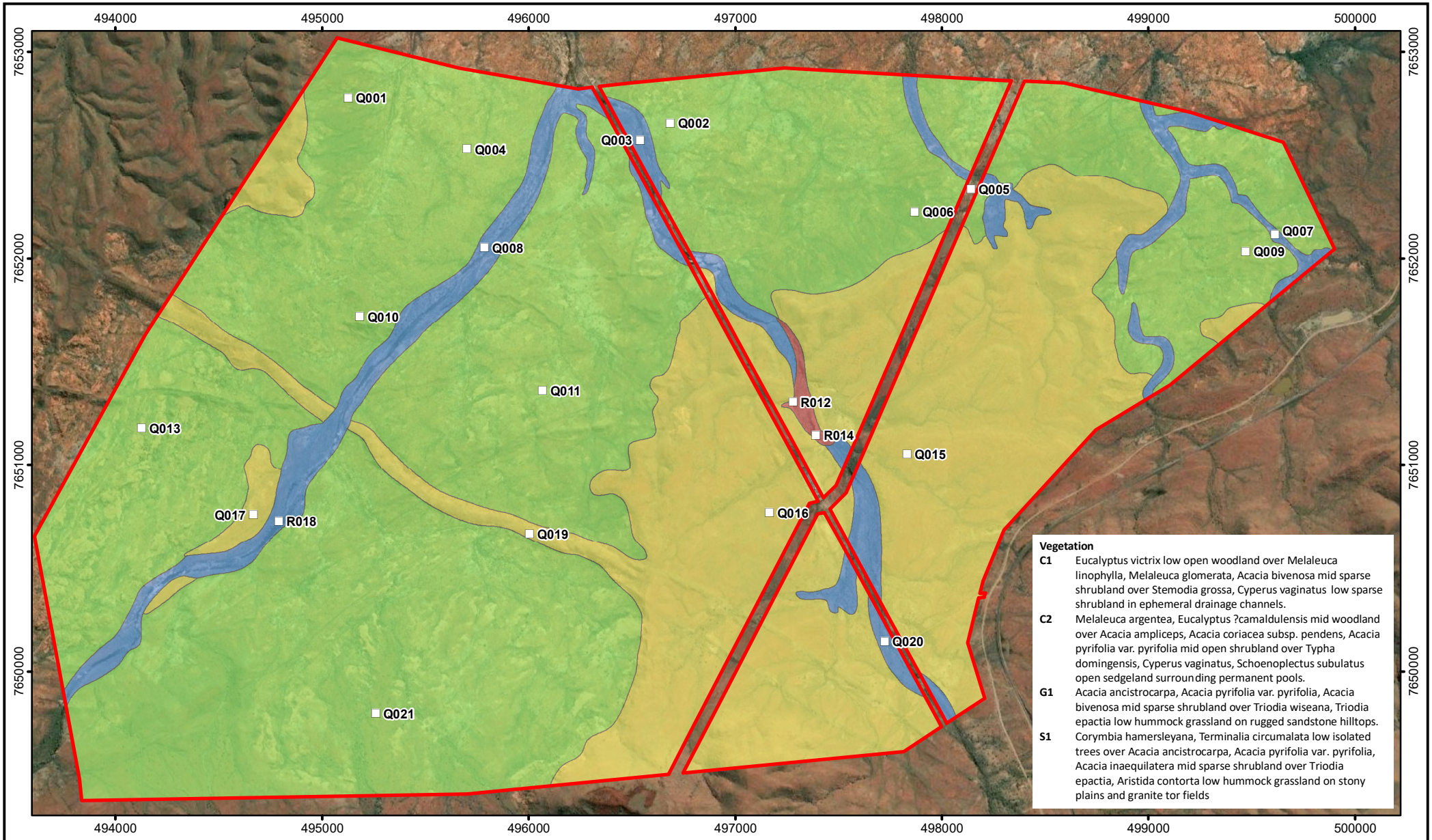
In addition to the statistical analysis, survey quadrat data, relevè data, and aerial photographic maps were used to delineate the boundaries of the vegetation communities within the Jinbi Project area. Based on the SIMPER analysis, quadrats within the C1 vegetation community were separated from the S1 and G1 communities based on the presence of *Melaleuca linophylla, Eucalyptus victrix* and the relatively lower foliage cover or absence of *Acacia ancistrocarpa, Acacia bivenosa* and *Triodia* spp. in comparison to other quadrats. Vegetation communities S1 and G1 were distinguished based primarily on the *Triodia* species present. *Triodia wiseana* was generally more dominant in G1 vegetation, where *Triodia epactia* was generally more dominant in S1 vegetation, although both were commonly recorded co-occurring. Smaller affinities were also observed in the shrub layer, with *Acacia ancistrocarpa* more dominant in G1 vegetation, and *Acacia bivenosa* more dominant in S1 vegetation. These differences in vegetation structure and composition correlated with the landforms and geology associated with the quadrat/relevè locations. S1 vegetation was associated with the granite outcrops and stony flats flanking the creek lines, where G1 vegetation was recorded growing in association with the large sandstone hills in the south of the Jinbi Project area (Figure 6). One additional vegetation community was mapped, C2, but was not included in the statistical analysis. This was because the shape and size of the areas representing C2 vegetation in the centre of the Jinbi Project Area were too small (<2500 m^2) to enable the establishment of a 50 x 50 m quadrat without intersecting ecotones or other vegetation types. Instead, relevé sites were assessed (R012, R014). Quadrat Q016 was assigned to S1 vegetation, statistically (Figure 5), based on the dominance of *Triodia epactia* and absence of *Triodia wiseana.* The composition of the very sparse shrub layer and the geology of the site, however, was more representative of G1 vegetation. For these reasons, Q016 was reassigned to G1 vegetation.

Vegetation outside of the Jinbi Project Area, within the Broader Investigation Area, was not sampled at sufficient intensity to inform any kind of vegetation mapping here. As per the scope of this reconnaissance survey, only a broad investigation of the flora and vegetation values of the Broader Investigation Area was undertaken. Excluding the potential Priority Ecological Communities (PECs) discussed in section 4.9 of this report, vegetation in the Broader Investigation Area was representative of the region (Mattiske Consulting 2023). Vegetation comprised primarily *Triodia* grasslands with emergent *Acacia* shrublands and *Corymbia* woodlands on rolling sandstone hills. Immediately to the west and southwest of the Jinbi Project Area, vegetation appeared uniform and similar to the G1 vegetation on large sandstone hills (Q023), intersected by ephemeral creeks in gullies (Q022). Access to this part of the Broader Investigation Area was poor. In

the east and southeast, hills were intersected by stony flats supporting *Acacia xiphophylla* woodlands with sparse understorey (Q027). In the south, sandstone hills supported areas of *Eucalyptus leucophloia* subsp. *leuocphloia* woodland over *Triodia brizoides* (Q033). In the far south, the Broader Investigation Area intersects a deeply dissected sandstone hill system supporting *Grevillea berryana* and *Eucalyptus leucophloia* subsp. *leucophloia* shrublands over *Triodia pisoliticola* (P3) grasslands. Quadrat data collected from the Broader Investigation Area is set out in Appendix G.

Table 5: Area coverage of each vegetation community delineated within the Jinbi Project Area.

Vegetation Community	Area Mapped (ha)	Proportion of Jinbi Project Area
C1	98.87	6.15%
C2	3.95	0.24%
G1	485.01	30.18%
S1	1018.92	63.41%
Totals	**1606.75**	**100.00%**



Legend

- Jinbi Project Area
- Quadrats

Vegetation

- C1
- C2
- G1
- S1

N

0 330 660 m

Scale: 1:25,000
MGA94 (Zone 50)

CAD Ref: a2994F006

Date: December 2023 | Rev: A | A4

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Yindjibarndi Energy Corporation
Yindjibarndi Renewable Energy Project
Vegetation Mapping

Figure: **6**

4.8 Threatened and Priority Flora

No threatened flora, as listed in the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2022* (DBCA 2023a), and pursuant to section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* and as listed by the DCCEEW (2023a), were recorded within the survey areas.

One priority 2 taxon, as listed by the DBCA (WAH 1998 -), was recorded within the Jinbi Project Area – *Pentalepis trichodesmoides* subsp. *hispida* (P2). *Pentalepis trichodesmoides* subsp. *hispida* (P2) was recorded at one location, representing one individual growing on the windrow of a track.

A further three priority taxa, as listed by the DBCA (WAH 1998-), were recording growing throughout the Broader Investigation Areas. These taxa were:

- *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)
- *Livistona alfredii* (P4)
- *Triodia pisoliticola* (P3)

The locations of these taxa are set out in Table 6 below, and illustrated in Figure 7. One dead and sterile specimen was collected within the Broader Investigation Area (Q031), which was suspected of potentially representing *Neptunia longipila* (P2). This specimen could not be confidently identified to species level given the lack of fertile material and its poor condition, and was consequently recorded as *Neptunia* sp.

Table 6: Conservation Significant Flora Locations Recorded within the Jinbi Project Area and Broader Investigation Area, November 2023.

Taxon	Survey area	Location (MGA94 zone 50)		Abundance
		Easting (m)	Northing (m)	
Pentalepis trichodesmoides subsp. *hispida* (P2)	Jinbi Project Area	498142	7652033	1
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)	Broader Investigation Area	498295	7629741	1
Livistona alfredii (P4)		481586	7625340	5
Triodia pisoliticola (P3)		496686	7619464	20
Triodia pisoliticola (P3)		496681	7619193	20

4.9 Conservation Significant Ecological Communities

One potential Priority Ecological Community (PEC), Riparian Flora and Plant Communities of Springs and River Pools with High Water Permanence of the Pilbara Region PEC (P2) (hereinafter referred to as the Riparian Flora and Plant Communities PEC), was identified within the Jinbi Project Area, and was mapped as the C2 vegetation community. C2 vegetation was described as:

Melaleuca argentea, Eucalyptus ?*camaldulensis* mid woodland over *Acacia ampliceps, Acacia coriacea* subsp. *pendens*, *Acacia pyrifolia* var. *pyrifolia* mid open shrubland over *Typha domingensis, Cyperus vaginatus, Schoenoplectus subulatus* open sedgeland surrounding permanent pools.

Species recorded within the C2 vegetation, specifically *Melaleuca argentea, Eucalyptus camaldulensis, Acacia ampliceps, Cyperus vaginatus, Typha domingensis, Schoenoplectus subulatus* and *Schoenus falcatus* (Appendix E) are listed as indicator species for the Riparian Flora and Plant Communities PEC (P3) (Lyons 2015, DBCA 2023b, summarised by Mattiske Consulting 2023). Further, the Yindjibarndi elders informed botanists in the field that the pools observed within the C2 vegetation are permanent springs, and do not dry up over summer. The C2 vegetation community was restricted to one gorge in the centre of the Jinbi Project Area (Figure 6). Within the mapped polygon, small pools and associated patches of

Typha domingensis and *Melaleuca argentea* thickets (Plates 1a and 1b) distinguished this vegetation from other creeks in the area (C1 vegetation).

Despite lacking the conservation significant species *Cladium procerum* (P2) and *Fimbristylis sieberiana* (P3), stipulated by DBCA (2023b) as being associated within the Riparian Flora and Plant Communities PEC (P3), the combination of water permanence and the presence of six indicator species, the C2 vegetation is highly likely to represent the Riparian Flora and Plant Communities PEC (P3).

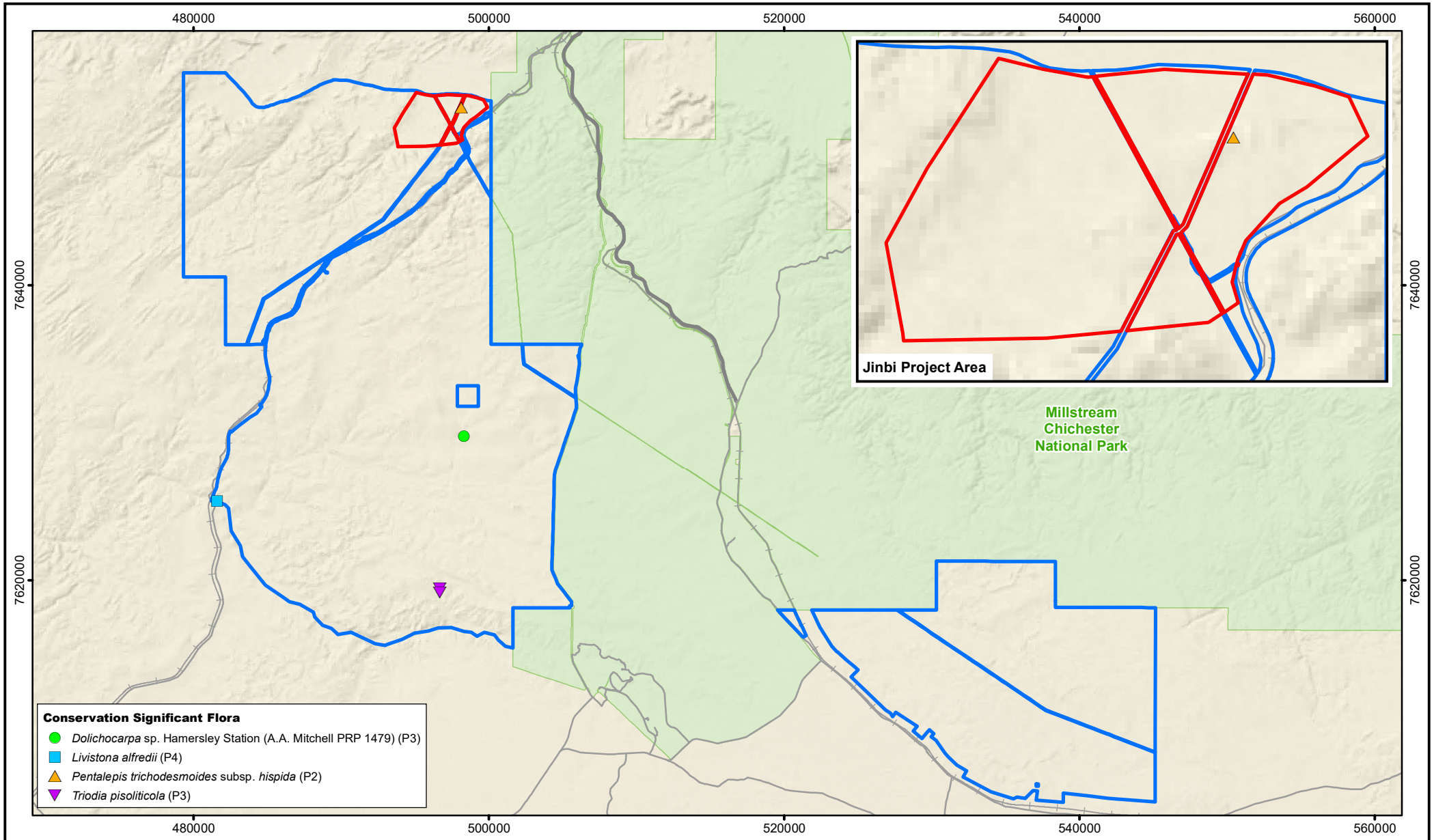
In the southwest of the Broader Investigation Area (R032, Figure 3), another *Melaleuca argentea* woodland over *Typha domingensis* around a seemingly permanent pool was recorded. This area was in poorer condition than the C2 vegetation community (cattle grazing), and supported fewer understorey indicator species (two taxa). For these reasons, this area is unlikely to represent the Riparian Flora and Plant Communities PEC (P3), but does represents a groundwater dependent ecosystem.

Within the parts of the Broader Investigation Areas visited during this field survey, one other potential PEC was identified. This PEC was the Cracking clays of the Chichester and Mungaroona Range PEC (P1). Almost all taxa within the two quadrats established within this vegetation type (Q025 and Q031) had senesced (Plate 2), although most taxa could be identified to genus level. Soil in these areas was uniquely friable compared to other areas visited, and the mid and overstories were absent. These areas also intersected the predictive PEC polygons mapped by DBCA (see Mattiske Consulting 2023), further suggesting that they represent the Cracking clays of the Chichester and Mungaroona Range PEC (P1).

Plate 1a: Relevè R014, likely representing the Riparian Flora and Plant Communities of Springs and River Pools with High Water Permanence of the Pilbara Region PEC (P2).

Plate 1b: Relevè R012, likely representing the Riparian Flora and Plant Communities of Springs and River Pools with High Water Permanence of the Pilbara Region PEC (P2)

Plate 2: Quadrat Q025, likely representing the Cracking clays of the Chichester and Mungaroona Range PEC (P1)



Legend

- Jinbi Project Area
- Broader Investigation Areas

N

0 4.5 9km

Scale: 1:350,000
MGA94 (Zone 50)

CAD Ref: a2994F008

Date: December 2023 | Rev: A | A4

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Yindjibarndi Energy Corporation
Yindjibarndi Renewable Energy Project
Conservation Significant Flora

Figure: **7**

5. DISCUSSION

Mattiske Consulting was engaged by the YEC to undertake a reconnaissance flora and vegetation survey of the Jinbi Project Area, and a broader survey of the flora and vegetation values of the Broader Investigation Areas, in November 2023.

5.1 Flora

A total of 177 vascular plant taxa which are representative of 110 genera and 44 families were recorded across the survey areas. The majority of taxa recorded were representative of the Fabaceae (67 taxa), Poaceae (33 taxa) and Myrtaceae (9 taxa) families. Within the Jinbi Project Area 121 vascular plant taxa were recorded, representing 81 genera and 34 families.

The plant taxa recorded during the survey were consistent with those reported in the desktop assessment (Mattiske Consulting 2023), which recorded the potential for 758 vascular plant species representing 78 families and 248 genera to occur within the survey areas. Of the species confidently identified and recorded within the survey areas during the field survey, only seven were not recorded by the desktop assessment (Mattiske Consulting 2023). These seven taxa were:

- *Acacia ligulata*;
- *Enchylaena tomentosa* var. *tomentosa;*
- *Erythrina vespertilio;*
- *Glinus lotoides;*
- *Sclerolaena gardneri;*
- *Sporobolus actinocladus*; and
- *Waltheria indica*

While these seven taxa were not recorded in the desktop assessment (Mattiske Consulting 2023), they do not represent range extensions or new taxa for the region (WAH 1998-). Rather, they are likely a product of the under-surveyed nature of the survey areas. The 50 km radius survey area used during the desktop assessment (centred on the survey areas) may represent a 'hole' in the known distribution of these seven taxa (WAH 1998-).

Four introduced (exotic) plant taxa were recorded within the survey areas. These taxa were:

- **Aerva javanica*
- **Cenchrus ciliaris*
- **Chloris barbata*
- **Parkinsonia aculeata*

Of these taxa, only **Aerva javanica* and **Cenchrus ciliaris* were recorded within the Jinbi Project Area. **Parkinsonia aculeata* is listed as a Declared Pest pursuant to Section 22(2) of the BAM Act. **Parkinsonia aculeata* is a Declared pest for the whole of Western Australia (Department of Primary Industries and Regional Development, [DPIRD] 2023a), and is subject to Control Category C3 (management) control measures (Appendix A3). The remaining three taxa are permitted species pursuant to Section 11 of the BAM Act. While no Declared pest taxa were recorded in the Jinbi Project Area, weed management practices should still be implemented to prevent the spread of permitted weed species and the introduction of new weed species from outside the survey areas. Further, the records of introduced taxa made here, at the end of the dry season (Table 4), likely represent the minimum local extent of these taxa. It would be expected that during the 2024 post wet-season survey the distribution of introduced taxa throughout the Jinbi Project Area would be larger, and annual introduced taxa would be more likely to be recorded.

5.2 Conservation Significant Flora

No threatened flora, as listed in the Biodiversity Conservation (Listing of Native Species) (Flora) Order 2022 (DBCA 2023a), and pursuant to section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* and as listed by the DCCEEW (2023a), were recorded within the survey areas.

One priority 2 taxon, as listed by the DBCA (WAH 1998 -) was recorded within the Jinbi Project Area – *Pentalepis trichodesmoides* subsp. *hispida* (P2). *Pentalepis trichodesmoides* subsp. *hispida* (P2) was recorded at one location (Table 6), representing one individual, within the Jinbi Project Area growing on the windrow of a track. *Pentalepis trichodesmoides* subsp. *hispida* (P2) is known to occur in the area (WAH 1998-) and was recorded in the desktop assessment (Mattiske Consulting 2023). Given that *Pentalepis trichodesmoides* subsp. *hispida* (P2) is a perennial species (WAH 1998-), the fact that this taxon was recorded at just one location during the November 2023 survey suggests that the local population is small. Further, this one record was from a disturbed area at the side of a powerline easement track, suggesting the germination of this taxon is promoted by ground disturbance. Bioturbation processes promoting germination of many taxa, historically supplied in the form of digging by native mammals (Mallen-Cooper *et al.* 2019, Ross *et al.* 2020), have largely ceased with the introduction of cats and foxes and the subsequent (local) extinction of many native mammals (Woinarski *et al.* 2019). It is for this reason that it is common for conservation significant taxa to germinate in disturbed areas, throughout the state. *Pentalepis trichodesmoides* subsp. *hispida* (P2) is known from 14 records throughout the Pilbara region, five of which are protected within either Millstream Chichester or Karijini National Park (WAH 1998-).

In December 2023, approximately one month after the field survey, the entirety of the Jinbi Project Area was burnt by wildfire. The vegetation regrowth present within the first year after fire often comprises a different suite of species, with much different vegetation structure, to those present in mature vegetation. At the time of writing, the region had received <5 mm of rainfall since the December 2023 fire meaning that post-fire vegetation regrowth within the Jinbi Project Area is therefore likely to be sparse, immature and/or sterile. Further, the fire response of *Pentalepis trichodesmoides* subsp. *hispida* (P2), or any of the conservation significant flora identified in the desktop assessment, is not well known.

Given these confounding factors (fire, poor wet-season rainfall to date, and the lack of fire response literature for *P. trichodesmoides* subsp. *hispida* (P2) and the conservation significant taxa identified in the desktop assessment), further survey work in 2024 and/or before substantial cyclonic rain is unlikely to improve the understanding of the extent of conservation significant flora within the Jinbi Project Area.

Records of three other conservation significant taxa (Table 6) were all made well outside of the Jinbi Project Area (Figure 7). *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3) and the potential record of *Neptunia longipila* (P2) were both associated with the vegetation likely representing the Cracking clays of the Chichester and Mungaroona Range PEC (P1). The record of *Livistona alfredii* (P4) from the extreme southwest of the Broader Investigation Area was made within 100 m of a historical record supplied by the WAH, and does not represent a new population. The records of *Triodia pisoliticola* (P3) from the southern part of the Broader Investigation Area also fall within the known rage of this taxon. All three of these conservation significant taxa from the Broader Investigation Areas are known to occur in National Parks. Further, at the time of writing, the YEC does not propose any disturbance within the Broader Investigation Area, outside of the Jinbi Project Area.

5.3 Vegetation Communities

The four vegetation communities delineated within the Jinbi Project Area were consistent with the regional vegetation types mapped by Beard (1990) and summarised by Mattiske Consulting (2023). With the exception of the C2 vegetation community, vegetation was representative of the region (Mattiske Consulting 2023). The C2 groundwater-dependent vegetation associated with the Jinbi (spring) is known to occur throughout the Pilbara but in small restricted pockets (Lyons 2015), and was considered to represent the Riparian Flora and Plant Communities PEC (P3) (DBCA 2023b). Ideally, statistical comparison of quadrat data collected from the Jinbi Project Area with reference data defining the PEC would be

undertaken. The small size of the C2 vegetation within the Jinbi Project area, however, did not allow the establishment of a 50 x 50 m quadrat without intersecting ecotones or adjacent vegetation types. A subjective comparison of the species recorded from relevé sites with indicator species highlighted by Lyons (2015) as representing the Riparian Flora and Plant Communities PEC (P3) was instead undertaken here. These indicator species are water-dependent, and found primarily (and sometimes exclusively) around permanent pools. While the C2 vegetation was the most restricted vegetation type recorded within the Jinbi Project Area (0.24%), it was restricted to a gorge (Plate 1a), which is unlikely to be a suitable area for infrastructure. Further, the C2 vegetation and the associated Jinbi is an important cultural site for the Yindjibarndi people (L. Coppin pers. comm., Greening Australia 2016). For these reasons, the YEC does not propose to disturb the C2 vegetation in association with the Jinbi Project. The relatively small impact footprint associated with solar energy infrastructure (when compared to open cut mining, for example), is also unlikely to impact the hydrology of the area, impacting the Jinbi.

Seven other PECs (in addition to the Riparian Flora and Plant Communities PEC (P3)) were identified during the desktop assessment of the Jinbi Project Area and Broader Investigation Area (Mattiske Consulting 2023). These seven other PECs were:

1. Cracking clays of the Chichester and Mungaroona Range PEC (P1);
2. Annual *Sorghum* grassland on self-mulching clays with a moderate-dense overlay of rocks PEC (P1);
3. Mitchell grass plains (*Astrebla* spp.) on gilgai PEC (P3);
4. Mitchell grass and Roebourne Plain grass (*Eragrostis xerophila*) plain on gilgai PEC (P3);
5. Horseflat Land System of the Roebourne Plains PEC (P3);
6. Kanjenjie Land System PEC (P3); and
7. Kumina Land System PEC (P3).

Whilst these seven PECs were identified in the desktop assessment within the wider region, the likelihood of their occurrence within the Jinbi Project Area was considered low. The PECs numbered 1-4 above constitute the Wona Land System, which does not intersect the Jinbi Project Area (Van Vreeswyk *et al.* 2004, Table 1 in Mattiske Consulting 2023). These PECs absence is further supported by the absence of any taxa from the *Sorghum* or *Astrebla* genera (Appendix C), and the absence of any soil resembling cracking clays, self-mulching clays, or gilgai (Appendix F). The Horseflat Land System of the Roebourne Plains PEC (P3) is described as Gilgaied clay plains supporting tussock grasslands and minor grassy snakewood shrublands (Van Vreeswyk *et al.* 2004). The absence of the Horseflat Land System of the Roebourne Plains PEC (P3) from the Jinbi Project Area is supported by the absence of the Horseflat Land System (Van Vreeswyk *et al.* 2004, Table 1 in Mattiske Consulting 2023), gilgaied clay soil, Snakewood (*Acacia xiphophylla*), and tussock grassland of any description from the Jinbi Project Area. The Kanjenjie Land System PEC (P3) is described as stony clay plains supporting tall shrublands of mulga, Snakewood and other *Acacia*s with an understorey of low shrubs or perennial grasses. Some parts are noted to support tussock grasslands of Mitchell grass or Roebourne Plains grass with few shrubs. The absence of the Kanjenjie Land System PEC (P3) from the Jinbi Project Area is supported by the absence of the Kanjenjie Land System (Van Vreeswyk *et al.* 2004, Table 1 in Mattiske Consulting 2023), stony clay plains, Mulga, and Snakewood (*Acacia xiphophylla*) from the Jinbi Project Area. The Kumina Land System PEC (P3) is described as Ferricrete duricrust plains, uplands and plateaux remnants with relief of up to 15 m, and duricrust plains and plateau remnants supporting hard spinifex grasslands (Van Vresswyk *et al.* 2004). The absence of the Kumina Land System PEC (P3) from the Jinbi Project Area is supported by the absence of the Kumina Land System (Van Vreeswyk *et al.* 2004, Table 1 of Mattiske Consulting 2023), and the absence of any duricrust plains or plateaux from the Jinbi Project Area (Appendix F). Soil within the Jinbi Project Area was observed to be mostly granite and sandstone-derived. The combination of the absence of almost all key features (plant taxa, soil, and geology) used to define these seven PECs from the Jinbi Project Area, and the adequate quadrat density and foot traverse intensity (Figure 3), makes it unlikely for these PECs to occur within the Jinbi Project Area. This conclusion is not considered to have been impacted by the poor timing of the reconnaissance survey, given that the indicator species used to define these PECs are mostly perennial, identified only to genus, or defined by abiotic factors (soil, geology). A statistical comparison of the quadrat data collected here against reference quadrat data, defining the PECs,

would provide a more robust analysis of these PECs representation within the Jinbi Project Area. Such reference data, however, is not available and qualitative comparisons of indicator species and geology, as done here, must be relied upon.

Vegetation within the Jinbi Project Area was sampled with an intensity (i.e., quadrat density) deemed suitable for a reconnaissance level survey. In December 2023, approximately one month after the field survey, the entirety of the Jinbi Project Area was burnt by wildfire. The suite of species that regenerate in the first year after fire often constitute a much different vegetation structure to those present in mature vegetation. At the time of writing, the region had received less than 5 mm of rainfall since the December 2023 fire and post-fire vegetation regrowth within the Jinbi Project Area is therefore likely sparse, immature and/or sterile. Until such time that the region has received adequate cyclonic rainfall, any follow-up or detailed vegetation surveys of the Jinbi Project Area, especially in 2024, are unlikely to improve on the flora and vegetation survey work presented here.

Vegetation around R032, in the far southwest of the Broader Investigation Area may also represent the Riparian Flora and Plant Communities PEC (P3). Vegetation in this area consisted of mature *Melaleuca argentea* woodlands with dense *Typha domingensis.* The broader creek bed made the vegetation more accessible to cattle, and was consequently more degraded than the C2 vegetation.

Approximately 20 km south of the Jinbi Project Area, near Ngurrawaana, Q025 and Q031 were suspected of representing the Cracking clays of the Chichester and Mungaroona Range PEC (P1). One of the defining features of this PEC is that it supports a diverse assemblage of poorly known and range restricted annual taxa (DBCA 2023b). At the time of this field survey, many taxa present had senesced and the diversity of annual species was very low. This was likely a result of the low rainfall received in the months preceding the survey (see section 4.1), and the timing of the survey being outside of the recommended March-June period. If the YEC proposes any development in these areas (i.e., those outside of the Jinbi Project Area) in the future, further survey in the recommended March-June period would be required.

6. CONCLUSIONS

Based on the results of the field survey of the Jinbi Project Area, both the range of flora taxa recorded and the vegetation types defined were consistent with the information recorded in the desktop assessment. The majority of the Jinbi Project Area consisted of *Triodia* grasslands with emergent *Corymbia* and *Acacia* shrublands on either granitic or sandstone derived substrates. These areas were intersected by ephemeral creeks supporting *Eucalyptus victrix* woodlands with *Melaleuca glomerata* and *Melaleica linophylla* shrublands. One restricted vegetation type was recorded in the centre of the Jinbi Project Area, surrounding a permanent Jinbi (spring). Vegetation in this area supported groundwater dependent *Melaleuca argentea* woodlands with *Typha domingensis* and *Schoenoplectus subulatus* thickets in the understorey. This vegetation (C2) is considered likely to represent the Riparian Flora and Plant Communities of Springs and River Pools with High Water Permanence of the Pilbara Region PEC (P2). One priority 2 taxon, *Pentalepis trichodesmoides* subsp. *hispida* (P2), was recorded growing on disturbed ground, at the edge of a vehicle track, in the east of the Jinbi Project Area. *Pentalepis trichodesmoides* subsp. *hispida* (P2) is known from 14 records across the Pilbara, five of which are protected within National Parks.

Seven other Priority Ecological Communities (in addition to the Riparian Flora and Plant Communities PEC (P3)) were identified during the desktop assessment of the Jinbi Project Area and Broader Investigation Area – all of which had a low likelihood of occurring within the Jinbi Project Area. Quadrat-based reference data for these seven other Priority Ecological Communities was not available for comparison with the quadrat data collected here, but the majority of the key indicator species used to define these Priority Ecological Communities (i.e., *Sorghum* spp., *Astrebla* spp., *Acacia xiphophylla*) were absent from the Jinbi Project Area. Key geologic and pedologic features of these seven Priority Ecological Communities (i.e., self-mulching clays, cracking clays, gilgaied clays) were also absent from the Jinbi Project Area. The combination of the absence of almost all key features (plant taxa, soil, and geology) used to define these seven Priority Ecological Communities from the Jinbi Project Area, and the adequate quadrat density and foot traverse intensity, makes it unlikely for these Priority Ecological Communities to occur within the Jinbi Project Area. This conclusion is not considered to have been impacted by the poor seasonal timing of the reconnaissance survey, given that the indicator species used to define these Priority Ecological Communities are mostly perennial, identified only to genus, or defined by abiotic factors (soil, geology).

In December 2023, approximately one month after the field survey, the entirety of the Jinbi Project Area was burnt by wildfire. The suite of species that regenerate in the first year after fire often constitute a much different vegetation structure to those present in mature vegetation. At the time of writing, the region had received less than 5 mm of rainfall since the December 2023 fire and post-fire vegetation regrowth within the Jinbi Project Area is therefore likely sparse, immature and/or sterile. Until such time that the region has received adequate cyclonic rainfall, any follow-up or detailed vegetation surveys of the Jinbi Project Area, especially in 2024, are unlikely to improve on the flora and vegetation survey work presented here.

Within the Broader Investigation Areas, vegetation was also consistent with that recorded in the desktop assessment, and of the region more broadly. Vegetation likely representing the Cracking clays of the Chichester and Mungaroona Range PEC (P1) was recorded near Ngurrawaana, within the Broader Investigation Area, although the poor timing of the survey meant that most taxa had senesced. If the YEC proposes any development in this part of the Broader Investigation Area (i.e., outside of the Jinbi Project Area) in the future, further survey work in the March-June period is recommended.

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8. PERSONNEL

The following Mattiske Consulting personnel were involved in this project:

Name	Position	Involvement	Flora Collection Permit Number
Dr E. M. Mattiske	Managing Director & Principal Ecologist	planning, management and report review	N/A
Zac Sims	Senior Botanist	Planning, fieldwork, plant identifications, data analysis, reporting	FB62000025-2; TFL 167-2021
Kayla Tribbeck	Experienced Botanist	Planning, fieldwork, report review	FB62000467-2

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APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*), **threatened flora** are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of threatened flora species
Note: Adapted from section 179 of the *EPBC Act*.

CODE	CATEGORY	DEFINITION
Ex	**Extinct**	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild**	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered**	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered**	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable**	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent**	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Biodiversity Conservation Act 2016 - WA* (*BC Act*) provides for (amongst other things) the protection of flora that is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2023*; Department of Biodiversity, Conservation and Attractions (DBCA) (DBCA 2023a), and are categorised under Division 1 (threatened species – critically endangered), Division 2 (threatened species - endangered), and Division 3 (threatened species – vulnerable)**.** A flora species is defined as **threatened flora** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the *BC Act*. Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species
Note: Adapted from *BC Act*

CODE	CATEGORY	DEFINITION
CR	**Critically endangered**	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1, Division 1 of the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2023*).
EN	**Endangered**	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 1 Division 2 of the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2023*).
VU	**Vulnerable**	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 1 Division 3 of the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2023*).

Priority flora species are defined as "possibly threatened species that do not the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient" or species that are "adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or are conservation dependent for other than taxonomic reasons" (DBCA 2023c). Priority species are not afforded the same level of protection under state or federal legislation as the listed Threatened species, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority [EPA] 2016a). DBCA categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of priority flora species
Note: Adapted from DBCA (2023c).

CODE	CATEGORY	DEFINITION
P1	**Priority 1:** Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	**Priority 2:** Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	**Priority 3:** Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	**Priority 4:** Rare, Near Threatened, and other species in need of monitoring	**a) Rare -** Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. **b) Near Threatened -** Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. **c) Other -** Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the *EPBC Act*, **threatened ecological communities** are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of threatened ecological communities
Note: Adapted from section 181 and section 182 of the *EPBC Act*.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Threatened ecological communities (TECs) are listed in the *Biodiversity Conservation (Threatened Ecological Communities) Order 2023* (under Part 2, Division 2, of the *BC Act*; DBCA 2023d). An ecological community is defined as **threatened** if it is facing an extremely high risk of collapse in the immediate, near or medium-term future, pursuant to sections 28, 29 and 30 of the *BC Act*. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2).

Table A2.2 State definition of threatened ecological communities
Note: Summarised from *BC Act* and DBCA 2023b

CODE	CATEGORY	DEFINITION
CO	**Collapsed ecological communities**	An ecological community is eligible for listing as a collapsed ecological community if either: **1.** there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or **2.** the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure
CR	**Critically Endangered**	An ecological community is eligible for listing as critically endangered if it is considered to be facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future when the best available evidence indicates that it meets **any** of the following criteria: **1.** The geographic distribution has been reduced by at least 80% or is less than 2000 km^2 for a single community **or** there are less than 2 areas of at least 100 km^2 **and** there is observed or inferred decline or threatening processes causing further decline; or **2.** Environmental degradation has occurred based on change in an abiotic or biotic variable affecting at least 80% of the extent of the ecological community **3.** Quantitative analysis that estimates the probability of ecological community collapse to be: at least 50% within 50 years.
EN	**Endangered**	An ecological community is eligible for listing in the category of endangered if it is considered to be facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future when the best available evidence indicates that it meets any of the following criteria: **1.** The geographic distribution has been reduced by, at least 50% or the geographic distribution is less than 20,000 km^2 for a single community **or** there are less than 20 areas of at least 100 km^2 **and** there is observed or inferred decline or threatening processes causing further decline; **2.** Environmental degradation has occurred based on change in an abiotic or biotic variable affecting either at least 50% of the extent of the ecological community; **3.** Quantitative analysis that estimates the probability of ecological community collapse to be: at least 20% within 50 years.
VU	**Vulnerable**	An ecological community is eligible for listing in the category of vulnerable at if it is considered to be facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future when the best available evidence indicates that it meets any of the following criteria: **1.** The geographic distribution has been reduced by, at least 30% or the geographic distribution is less than 50,000 km^2 for a single community **or** there are less than 50 areas of at least 100 km^2 **and** there is observed or inferred decline or threatening processes causing further decline; or **2.** Environmental degradation has occurred based on change in an abiotic or biotic variable affecting either at least 30% of the extent of the ecological community; or **3.** Quantitative analysis that estimates the probability of ecological community collapse to be at least 10% within 100 years.

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by DBCA (2023b) in the *Priority Ecological Communities for Western Australia – Version 35 (19 June 2023)*. Similarly, to priority flora, PECs are not afforded legislative protection, however are considered significant under the EPA's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. DBCA categorises PECs into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities
Note: Adapted from DBCA (2023c).

CODE	CATEGORY	DEFINITION
P1	**Priority 1** (Poorly known ecological communities)	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat or for which current threats exist. Communities may be included if they are well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range
P2	**Priority 2** (Poorly known ecological communities)	Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200 ha). At least some occurrences are not under immediate threat (within approx. 10 yrs.) of destruction or degradation. Communities may be included if they are well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3	**Priority 3** (Poorly known ecological communities)	Communities may be included if they are well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them. This category includes three sub-categories: (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation. (ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approx. 10 yrs.). (iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across their range from processes such as grazing by, inappropriate fire regimes, clearing, hydrological change, etc
P4	**Priority 4** (Ecological communities that are adequately known, rare but not threatened or that have been recently removed from the threatened list.)	Ecological communities that are adequately known and either rare but not threatened, near threatened, or have recently been removed from the threatened list. These communities require regular monitoring. (i) Rare: ecological communities known from few occurrences that are considered to have been adequately surveyed, and that are not currently threatened, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near threatened: ecological communities that are considered to have been adequately surveyed and that do not qualify as conservation dependent, but that are close to qualifying for a higher threat category. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5	**Priority 5** (Conservation Dependent ecological communities)	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (*BAM Act*) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the *BAM Act*, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the *BAM Act* is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development [DPIRD] 2023).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: **(i)** alleviate the harmful impact of the declared pest in the area; or **(ii)** reduce the number or distribution of the declared pest in the area; or **(iii)** prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: **(a)** alleviate the harmful impact of the declared pest in the area for which it is declared; or **(b)** reduce the number or distribution of the declared pest in the area for which it is declared; or **(c)** prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (*EP Act*) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENDIX A5: DEFINITION OF VEGETATION CONDITION SCALE FOR THE EREMAEAN AND NORTHERN BOTANICAL PROVINCES

Vegetation condition ratings relate to vegetation structure, level of disturbance at each structural layer and the ability of the vegetation unit to regenerate (Table A5.1). Vegetation condition provides complementary information for assessing the significance of potential impacts.

Table A5.1 Definition of vegetation condition categories

Note: Adapted from Trudgen (1988).

CATEGORY	DEFINITION
Excellent	Pristine or nearly so, no obvious sign of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely of almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX A6: NVIS STRUCTURAL FORMATION TERMINOLOGY

Note: Adapted from NVIS Technical Working Group (2017).

COVER CHARACTERISTICS							
Foliage cover	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% cover	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

GROWTH FORM	HEIGHT RANGES (m)	STRUCTURAL FORMATION CLASSES						
tree, palm	<10, 10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, tree-fern	<1, 1-2, >2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	<1, 1-2, >2	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	<1, 1-2, >2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	<0.5, >0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	spare samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	<2, >2	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	<0.5, >0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grassland	isolated clumps of tussock grasses	tussock grasses
other grass	<0.5, >0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	<0.5, >0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	<0.5, >0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	<0.5, >0.5	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	<1, 1-2, >2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
bryophyte	<0.5	closed bryophytelan d	bryophytelan d	open bryophytela nd	sparse bryophyteland	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	<10, 10-30, >30	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
aquatic	0-0.5, <1	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
seagrass	0-0.5, <1	closed seagrass bed	seagrass bed	open seagrass bed	sparse seagrasses	isolated seagrasses	isolated clumps of seagrasses	seagrasses

APPENDIX B: QUADRAT AND RELEVE LOCATIONS ESTABLISHED WITHIN THE JINBI PROJECT

Survey Area	Site	Coordinates (MGA94 z50)	
		Easting (m)	Northing (m)
Jinbi Project Area	Q001	495126	7652777
	Q002	496685	7652654
	Q003	496538	7652573
	Q004	495701	7652529
	Q005	498141	7652335
	Q006	497869	7652225
	Q007	499612	7652114
	Q008	495786	7652052
	Q009	499471	7652033
	Q010	495183	7651718
	Q011	496067	7651360
	R012	497279	7651305
	Q013	494126	7651177
	R014	497390	7651143
	Q015	497832	7651052
	Q016	497166	7650768
	Q017	494667	7650758
	R018	494790	7650726
	Q019	496004	7650665
	Q020	497724	7650145
	Q021	495260	7649796
Broader Investigation Area	Q022	494308	7647727
	Q023	494209	7647404
	R024	484730	7636514
	Q025	488255	7636219
	R026	502465	7634838
	Q027	505529	7634802
	Q028	502575	7634776
	Q029	505364	7634448
	Q030	498085	7630055
	Q031	498295	7629741
	R032	481320	7625419
	Q033	497097	7622749
	Q034	496686	7619464
	Q035	496681	7619193

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT THE JINBI PROJECT

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2023c); Yindjibarndi names follow Greening Australia (2016).

Family	Species (Yindjibarndi Name if Applicable)	Jinbi Project Area	Broader Investigation Area
Amaranthaceae	* *Aerva javanica*	x	
	Alternanthera nodiflora		x
	Gomphrena cunninghamii	x	
	?*Gomphrena* sp.	x	
	Ptilotus astrolasius	x	x
	Ptilotus calostachyus	x	x
	Ptilotus exaltatus		x
	Ptilotus sp.	x	
Arecaceae	*Livistona alfredii* (P4)		x
Asteraceae	*Ixiochlamys cuneifolia*		x
	Pentalepis trichodesmoides subsp. *hispida* (P2)	x	
	Pluchea rubelliflora		x
	Pterocaulon sphaeranthoides	x	
	Pluchea sp.	x	x
	Streptoglossa sp.	x	
	Asteraceae sp.	x	x
Boraginaceae	*Ehretia saligna* var. *saligna* (Thuwirriny)	x	x
	Euploca cunninghamii	x	
	Euploca ovalifolia		x
	Trichodesma zeylanicum var. *zeylanicum*	x	
	Boraginaceae sp.	x	
Brassicaceae	*Lepidium pedicellosum*		x
Campanulaceae	*Lobelia arnhemiaca*	x	
Caryophyllaceae	*Polycarpaea holtzei*	x	x
	Polycarpaea longiflora	x	
	Polycarpaea sp.	x	x
Chenopodiaceae	*Atriplex* sp.		x
	Enchylaena tomentosa var. *tomentosa*		x
	Salsola australis	x	x
	Sclerolaena gardneri		x
Clemoaceae	*Arivela viscosa*	x	x
Combretaceae	*Terminalia circumalata*	x	

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT THE JINBI PROJECT

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2023c); Yindjibarndi names follow Greening Australia (2016).

Family	Species (Yindjibarndi Name if Applicable)	Jinbi Project Area	Broader Investigation Area
Convolvulaceae	*Evolvulus alsinoides* var. *villosicalyx*	x	x
	Ipomoea sp.		x
	Polymeria ambigua	x	
	Convolvulaceae sp.	x	x
Cucurbitaceae	*Cucumis* sp.		x
Cyperaceae	*Cyperus vaginatus* (Yahhirri)	x	x
	Eleocharis geniculata	x	x
	Fimbristylis ferruginea		x
	Schoenoplectus subulatus	x	x
	Schoenus falcatus	x	
	Cyperaceae sp.	x	x
Euphorbiaceae	*Euphorbia careyi*		x
	Euphorbia sp.	x	
	Euphorbia sp. 1	x	
	Euphorbia sp. 2	x	
Fabaceae	*Acacia acradenia*		x
	Acacia ampliceps	x	x
	Acacia ancistrocarpa (Barbirriny)	x	
	Acacia arida	x	
	Acacia bivenosa	x	x
	Acacia colei var. *colei* (Gurganyan)		x
	Acacia coriacea subsp. *pendens*	x	x
	Acacia inaequilatera (Bardirri)	x	x
	Acacia ligulata		x
	Acacia maitlandii	x	x
	Acacia pyrifolia var. *morrisonii*		x
	Acacia pyrifolia var. *pyrifolia* (Ganyji)	x	x
	Acacia ?sibirica		x
	Acacia trachycarpa	x	x
	Acacia tumida var. *pilbarensis* (Muwarlingu)	x	x
	Acacia xiphophylla		x
	Cullen leucochaites		x
	Erythrina vespertilio		x
	Indigofera linifolia	x	x
	Indigofera monophylla	x	x
	Indigofera sp.	x	
	Neptunia sp.		x
	* *Parkinsonia aculeata*		x
	Rhynchosia minima		x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT THE JINBI PROJECT

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2023c); Yindjibarndi names follow Greening Australia (2016).

Family	Species (Yindjibarndi Name if Applicable)	Jinbi Project Area	Broader Investigation Area
Fabaceae	*Rhynchosia* ?*minima*		x
	Senna ?*notabilis*	x	x
	Senna artemisioides subsp. *helmsii*		x
	Senna artemisioides subsp. *oligophylla* (Nyirri)	x	x
	Senna glutinosa	x	x
	Sesbania cannabina	x	x
	Sesbania formosa		x
	Tephrosia rosea	x	
	Tephrosea sp.	x	
	Fabaceae sp.	x	x
Gentianaceae	*Schenkia* sp.	x	
Goodeniaceae	*Dampiera candicans*	x	
	Goodenia ?*lamprosperma*	x	
	Goodenia stobbsiana	x	x
	Goodenia sp.	x	
	Goodeniaceae sp.	x	x
Gyrostemonaceae	*Gyrostemon* sp.		x
Lauraceae	*Cassytha* sp.	x	x
Loranthaceae	*Amyema sanguinea* var. *sanguinea*	x	
Malvaceae	*Brachychiton acuminatus*	x	
	Corchorus ?*lasiocarpus*	x	
	Corchorus sp.	x	x
	Gossypium australe	x	x
	Gossypium robinsonii		x
	Sida ?*fibulifera*		x
	Sida sp.	x	x
	Triumfetta sp.	x	
	Waltheria indica	x	
	Malvaceae sp.	x	x
Marsileaceae	*Marsilea hirsuta*		x
Menispermaceae	*Tinospora smilacina* (Gurrbinyurra)	x	x
Molluginaceae	*Glinus lotoides*		x
	Trigastrotheca molluginea	x	x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT THE JINBI PROJECT

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2023c); Yindjibarndi names follow Greening Australia (2016).

Family	Species (Yindjibarndi Name if Applicable)	Jinbi Project Area	Broader Investigation Area
Moraceae	*Ficus ?brachypoda* (Winyarrangu)	x	
Myrtaceae	*Corymbia hamersleyana* (Bunaanga)	x	x
	*Eucalyptus camaldulensis (*Wirranggaa)		x
	Eucalyptus ?camaldulensis	x	
	Eucalyptus leucophloia subsp. *leucophloia* (Majgan)		x
	Eucalyptus victrix (Wirlu)	x	x
	Eucalyptus sp.	x	
	Melaleuca argentea (Jirlurru or Marba)	x	x
	Melaleuca glomerata (Gurliwirn)	x	x
	Melaleuca linophylla	x	
Nyctaginaceae	*Boerhavia gardneri*	x	
	Boerhavia sp.	x	x
Oleaceae	*Jasminum didymum* subsp. *lineare*		x
Phrymaceae	*Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768)		x
Phyllanthaceae	*Flueggea virosa* subsp. *melanthesoides*	x	
	Nellica maderaspatensis	x	x
Plantaginaceae	*Stemodia grossa* (Minyjarra)	x	x
	Stemodia sp.		x
Poaceae	*Aristida contorta*	x	x
	Aristida latifolia		x
	* *Cenchrus ciliaris*	x	x
	* *Chloris barbata*		x
	Chrysopogon fallax		x
	Chrysopogon sp.		x
	Cymbopogon ambiguus (Malhanggaa)	x	x
	Cynodon convergens		x
	Diplachne fusca subsp. *fusca*		x
	Enneapogon ?lindleyanus	x	
	Enneapogon caerulescens		x
	Eragrostis elongata	x	
	Eragrostis sp.	x	
	Eragrostis xerophila		x
	Eriachne ciliata	x	
	Eriachne mucronata	x	x
	Eriachne pulchella	x	
	Eriachne sp.	x	x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT THE JINBI PROJECT

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2023c); Yindjibarndi names follow Greening Australia (2016).

Family	Species (Yindjibarndi Name if Applicable)	Jinbi Project Area	Broader Investigation Area
Poaceae (continued)	*Eulalia aurea*	x	x
	Heteropogon contortus		x
	Iseilema ?*vaginiflorum*	x	x
	Panicum decompositum (Bilaa)	x	x
	Panicum sp.	x	x
	Sporobolus actinocladus		x
	Sporobolus australasicus	x	x
	Themeda triandra	x	x
	Triodia angusta	x	x
	Triodia brizoides		x
	Triodia epactia (Yahli)	x	x
	Triodia pisoliticola (P3)		x
	Triodia wiseana (Wirrbingurra or Baru)	x	x
	Triodia sp.	x	
	Poaceae sp.	x	x
Potamogetonaceae	*Potamogeton* ?*tepperi*		x
Primulaceae	*Samolus* sp. Millstream (M.I.H. Brooker 2076)		x
Proteaceae	*Grevillea berryana*		x
	Grevillea pyramidalis subsp. *leucadendron* (Gura)	x	x
	Grevillea wickhamii Ngajarndangu)	x	x
	Grevillea sp.	x	
	?*Grevillea* sp.	x	
	Hakea chordophylla	x	
	Hakea lorea (Garruwa)	x	x
Pteridaceae	*Cheilanthes* sp.	x	
Rubiaceae	*Dolichocarpa crouchiana*		x
	Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)		x
	Synaptantha tillaeacea var. *tillaeacea*	x	
Sapindaceae	*Dodonaea coriacea*	x	
Scrophulariaceae	*Eremophila fraseri* subsp. *parva*		x
Solanaceae	*Solanum diversiflorum* (Garlumba)	x	
	Solanum phlomoides	x	
	Solanum sp.	x	

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT THE JINBI PROJECT

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2023c); Yindjibarndi names follow Greening Australia (2016).

Family	Species (Yindjibarndi Name if Applicable)	Jinbi Project Area	Broader Investigation Area
Stylidiaceae	*Stylidium fluminense*	x	x
Typhaceae	*Typha domingensis*	x	x
Violaceae	*Afrohybanthus aurantiacus*	x	x
Zygophyllaceae	*Tribulus suberosus* (Gawiwarnda)	x	x

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Jinbi Project Area																					
	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q013	Q015	Q016	Q017	Q019	Q020	Q021	R012	R014	R018	OPPO
Acacia acradenia																						
Acacia ampliceps								x									x		x	x		
Acacia ancistrocarpa	x	x		x	x	x			x	x	x		x	x		x		x		x		
Acacia arida										x					x							
Acacia bivenosa		x		x	x		x	x		x	x				x	x	x	x			
Acacia colei var. *colei*																						
Acacia coriacea subsp. *pendens*			x																x	x	x	
Acacia inaequilatera	x			x	x	x			x	x								x				
Acacia ligulata																						
Acacia maitlandii									x	x		x	x	x								
Acacia pyrifolia var. *morrisonii*																						
Acacia pyrifolia var. *pyrifolia*		x	x		x	x	x	x		x	x	x		x	x	x	x	x	x			
Acacia ?sibirica																						
Acacia trachycarpa			x					x									x			x	x	
Acacia tumida var. *pilbarensis*												x				x		x		x		
Acacia xiphophylla																						
**Aerva javanica*																	x					
Afrohybanthus aurantiacus			x					x											x			
Alternanthera nodiflora																						
Amyema sanguinea var. *sanguinea*							x														x	x
Aristida contorta				x		x			x		x	x	x									
Aristida latifolia																						
Arivela viscosa			x					x									x		x	x		
Asteraceae sp.												x	x	x	x							
Atriplex sp.																						
Boerhavia gardneri																				x		
Boerhavia sp.				x	x										x		x					
Boraginaceae sp.			x																			
Brachychiton acuminatus												x								x		
Cassytha sp.			x				x	x					x				x		x	x		
**Cenchrus ciliaris*			x					x									x		x			

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Jinbi Project Area																				
	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q013	Q015	Q016	Q017	Q019	Q020	Q021	R012	R014	R018	OPPO
Cheilanthes sp.												x										
**Chloris barbata*																						
Chrysopogon fallax																						
Chrysopogon sp.																						
Convolvulaceae sp.			x				x														x	
Corchorus ?lasiocarpus						x			x				x	x		x		x				
Corchorus sp.	x			x				x	x								x					
Corymbia hamersleyana		x										x				x				x		
Cucumis sp.																						
Cullen leucochaites																						
Cymbopogon ambiguus												x							x			
Cynodon convergens																						
Cyperaceae sp.				x			x	x	x	x			x									
Cyperus vaginatus			x				x	x									x		x	x	x	
Dampiera candicans												x										
Diplachne fusca subsp. *fusca*																						
Dodonaea coriacea																		x				
Dolichocarpa crouchiana																						
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)																						
Ehretia saligna var. *saligna*																			x			
Eleocharis geniculata																				x		
Enchylaena tomentosa var. *tomentosa*																						
Enneapogon ?lindleyanus																				x		
Enneapogon caerulescens																						
Eragrostis elongata								x														
Eragrostis sp.							x					x										
Eragrostis xerophila																						
Eremophila fraseri subsp. *parva*																						
Eriachne ciliata	x								x	x	x	x	x					x				
Eriachne mucronata			x					x											x			
Eriachne pulchella							x							x	x							

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Jinbi Project Area																				
	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q013	Q015	Q016	Q017	Q019	Q020	Q021	R012	R014	R018	OPPO
Eriachne sp.							x										x					
Erythrina vespertilio																						
Eucalyptus camaldulensis																						
Eucalyptus ?camaldulensis																			x			
Eucalyptus leucophloia subsp. *leucophloia*																						
Eucalyptus victrix			x				x	x													x	
Eucalyptus sp.			x																	x		
Eulalia aurea			x				x	x									x		x			
Euphorbia careyi																						
Euphorbia sp.				x							x											
Euphorbia sp. 1																	x					
Euphorbia sp. 2																	x					
Euploca cunninghamii											x											
Euploca ovalifolia																						
Evolvulus alsinoides var. *villosicalyx*				x																		
Fabaceae sp.			x					x										x				
Ficus ?brachypoda																				x		
Fimbristylis ferruginea																						
Flueggea virosa subsp. *melanthesoides*																			x	x		
Glinus lotoides																						
Gomphrena cunninghamii								x				x	x									
?*Gomphrena* sp.	x									x												
Goodenia ?lamprosperma			x																			
Goodenia stobbsiana													x									x
Goodenia sp.											x											
Goodeniaceae sp.		x			x												x					
Gossypium australe																x						
Gossypium robinsonii																						
Grevillea berryana																						
Grevillea pyramidalis subsp. *leucadendron*		x		x	x	x		x			x				x							
Grevillea sp.																				x		

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Jinbi Project Area																				
	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q013	Q015	Q016	Q017	Q019	Q020	Q021	R012	R014	R018	OPPO
?*Grevillea* sp.																	x					
Grevillea wickhamii		x			x				x	x		x			x	x		x				
Gyrostemon sp.																						
Hakea chordophylla				x																		
Hakea lorea		x							x				x		x							
Heteropogon contortus																						
Indigofera linifolia								x				x				x						
Indigofera monophylla					x	x			x		x		x		x		x	x				
Indigofera sp.											x				x	x						
Ipomoea sp.																						
Iseilema ?*vaginiflorum*	x																					
Ixiochlamys cuneifolia																						
Jasminum didymum subsp. *lineare*																						
Lepidium pedicellosum																						
Lobelia arnhemiaca							x												x	x		
Malvaceae sp.										x												
Marsilea hirsuta																						
Melaleuca argentea																			x			
Melaleuca glomerata			x				x	x												x	x	
Melaleuca linophylla			x				x	x									x		x	x	x	
Nellica maderaspatensis			x														x		x			
Neptunia sp.																						
Panicum decompositum																	x		x			
Panicum sp.			x				x													x		
**Parkinsonia aculeata*																						
Pentalepis trichodesmoides subsp. *hispida* (P2)																						x
Peplidium sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768)																						
Pluchea rubelliflora																						
Pluchea sp.			x				x	x									x					
Poaceae sp.				x						x												
Polycarpaea holtzei	x					x			x	x	x	x			x			x				

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Jinbi Project Area																				
	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q013	Q015	Q016	Q017	Q019	Q020	Q021	R012	R014	R018	OPPO
Polycarpaea longiflora												x								x		
Polycarpaea sp.	x			x					x	x			x									
Polymeria ambigua								x			x						x					
Potamogeton ?tepperi																						
Pterocaulon sphaeranthoides			x	x				x		x							x					
Ptilotus astrolasius	x	x		x		x			x				x			x						
Ptilotus calostachyus													x	x								
Ptilotus exaltatus																						
Ptilotus sp.		x																x				
Rhynchosia minima																						
Rhynchosia ?minima																						
Salsola australis	x																					
Samolus sp. Millstream (M.I.H. Brooker 2076)																						
Schenkia sp.							x															
Schoenoplectus subulatus																			x	x		
Schoenus falcatus																				x		
Sclerolaena gardneri																						
Senna ?notabilis												x										
Senna artemisioides subsp. *helmsii*																						
Senna artemisioides subsp. *oligophylla*	x								x									x				
Senna glutinosa				x	x				x					x	x	x		x		x		
Sesbania cannabina							x										x					
Sesbania formosa																						
Sida ?fibulifera																						
Sida sp.					x						x				x		x	x				
Solanum diversiflorum																	x					
Solanum phlomoides									x													
Solanum sp.																				x		
Sporobolus actinocladus																						
Sporobolus australasicus				x				x														
Stemodia grossa			x				x	x									x		x	x		

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Jinbi Project Area																				
	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q013	Q015	Q016	Q017	Q019	Q020	Q021	R012	R014	R018	OPPO
Stemodia sp.																						
Streptoglossa sp.				x		x					x				x		x					
Stylidium fluminense																				x		
Synaptantha tillaeacea var. *tillaeacea*										x												
Tephrosia rosea			x					x							x		x			x		
Tephrosea sp.							x															
Terminalia circumalata							x					x								x	x	
Themeda triandra																x						
Tinospora smilacina																			x	x		
Tribulus suberosus													x			x						x
Trichodesma zeylanicum var. *zeylanicum*																x						x
Trigastrotheca molluginea						x					x							x				
Triodia angusta																	x					
Triodia brizoides																						
Triodia epactia	x	x	x	x		x	x		x	x	x	x	x	x	x	x	x	x				
Triodia pisoliticola (P3)																						
Triodia wiseana					x				x	x			x		x	x						
Triodia sp.								x													x	
Triumfetta sp.					x				x		x	x	x									
Typha domingensis																			x	x	x	
Waltheria indica																						x

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Broader Investigation Areas														
	Q022	Q023	Q025	Q027	Q028	Q029	Q030	Q031	Q033	Q034	Q035	R024	R026	R032	OPPO
Acacia acradenia									x		x				
Acacia ampliceps							x					x			
Acacia ancistrocarpa															
Acacia arida															
Acacia bivenosa					x						x	x	x		
Acacia colei var. *colei*															x
Acacia coriacea subsp. *pendens*				x			x					x			
Acacia inaequilatera					x	x							x		
Acacia ligulata				x											
Acacia maitlandii									x		x				
Acacia pyrifolia var. *morrisonii*	x	x													
Acacia pyrifolia var. *pyrifolia*									x		x	x			
Acacia ?sibirica									x	x	x				
Acacia trachycarpa							x								
Acacia tumida var. *pilbarensis*	x	x									x				
Acacia xiphophylla				x											
**Aerva javanica*															
Afrohybanthus aurantiacus												x			
Alternanthera nodiflora													x		
Amyema sanguinea var. *sanguinea*															
Aristida contorta		x						x							
Aristida latifolia			x		x			x							
Arivela viscosa							x	x							
Asteraceae sp.			x		x			x							
Atriplex sp.				x											
Boerhavia gardneri															
Boerhavia sp.		x	x		x	x	x	x							
Boraginaceae sp.															
Brachychiton acuminatus															
Cassytha sp.	x											x	x		
**Cenchrus ciliaris*				x		x	x						x		

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Broader Investigation Areas														
	Q022	Q023	Q025	Q027	Q028	Q029	Q030	Q031	Q033	Q034	Q035	R024	R026	R032	OPPO
Cheilanthes sp.															
**Chloris barbata*							x								
Chrysopogon fallax					x										
Chrysopogon sp.								x							
Convolvulaceae sp.							x								
Corchorus ?lasiocarpus															
Corchorus sp.									x				x		
Corymbia hamersleyana	x	x				x			x						
Cucumis sp.													x		
Cullen leucochaites															x
Cymbopogon ambiguus	x						x		x			x			
Cynodon convergens			x												
Cyperaceae sp.		x							x						
Cyperus vaginatus							x					x	x	x	
Dampiera candicans															
Diplachne fusca subsp. *fusca*													x		
Dodonaea coriacea															
Dolichocarpa crouchiana										x					
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)								x							
Ehretia saligna var. *saligna*															x
Eleocharis geniculata														x	
Enchylaena tomentosa var. *tomentosa*				x											
Enneapogon ?lindleyanus															
Enneapogon caerulescens							x	x							
Eragrostis elongata															
Eragrostis sp.															
Eragrostis xerophila								x							
Eremophila fraseri subsp. *parva*									x						
Eriachne ciliata															
Eriachne mucronata									x					x	
Eriachne pulchella															

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Broader Investigation Areas														
	Q022	Q023	Q025	Q027	Q028	Q029	Q030	Q031	Q033	Q034	Q035	R024	R026	R032	OPPO
Eriachne sp.							x								
Erythrina vespertilio													x		x
Eucalyptus camaldulensis							x								
Eucalyptus ?*camaldulensis*															
Eucalyptus leucophloia subsp. *leucophloia*									x	x					
Eucalyptus victrix											x	x		x	
Eucalyptus sp.															
Eulalia aurea					x		x					x			
Euphorbia careyi												x			
Euphorbia sp.															
Euphorbia sp. 1															
Euphorbia sp. 2															
Euploca cunninghamii															
Euploca ovalifolia											x				
Evolvulus alsinoides var. *villosicalyx*							x								
Fabaceae sp.			x		x			x							
Ficus ?*brachypoda*															
Fimbristylis ferruginea														x	
Flueggea virosa subsp. *melanthesoides*															
Glinus lotoides													x		
Gomphrena cunninghamii															
?*Gomphrena* sp.															
Goodenia ?*lamprosperma*															
Goodenia stobbsiana		x							x	x	x				
Goodenia sp.															
Goodeniaceae sp.									x						
Gossypium australe	x											x			
Gossypium robinsonii												x			
Grevillea berryana										x					
Grevillea pyramidalis subsp. *leucadendron*	x												x		
Grevillea sp.															

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Broader Investigation Areas														
	Q022	Q023	Q025	Q027	Q028	Q029	Q030	Q031	Q033	Q034	Q035	R024	R026	R032	OPPO
?*Grevillea* sp.															
Grevillea wickhamii											x				
Gyrostemon sp.											x				
Hakea chordophylla															
Hakea lorea			x												
Heteropogon contortus							x								
Indigofera linifolia						x		x							
Indigofera monophylla									x		x				
Indigofera sp.															
Ipomoea sp.												x			
Iseilema ?*vaginiflorum*			x												
Ixiochlamys cuneifolia						x									
Jasminum didymum subsp. *lineare*													x		
Lepidium pedicellosum											x				
Lobelia arnhemiaca															
Malvaceae sp.					x										
Marsilea hirsuta							x								
Melaleuca argentea														x	
Melaleuca glomerata							x					x		x	
Melaleuca linophylla															
Nellica maderaspatensis			x										x		
Neptunia sp.								x							
Panicum decompositum					x		x						x		
Panicum sp.												x	x		
**Parkinsonia aculeata*														x	
Pentalepis trichodesmoides subsp. *hispida* (P2)															
Peplidium sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768)														x	
Pluchea rubelliflora							x								
Pluchea sp.													x	x	
Poaceae sp.	x	x		x			x								
Polycarpaea holtzei									x						

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Broader Investigation Areas														
	Q022	Q023	Q025	Q027	Q028	Q029	Q030	Q031	Q033	Q034	Q035	R024	R026	R032	OPPO
Polycarpaea longiflora															
Polycarpaea sp.		x													
Polymeria ambigua															
Potamogeton ?tepperi												x		x	
Pterocaulon sphaeranthoides															
Ptilotus astrolasius									x		x				
Ptilotus calostachyus									x		x				
Ptilotus exaltatus				x				x			x				
Ptilotus sp.															
Rhynchosia minima					x								x		
Rhynchosia ?minima			x												
Salsola australis				x		x									
Samolus sp. Millstream (M.I.H. Brooker 2076)														x	
Schenkia sp.															
Schoenoplectus subulatus							x								
Schoenus falcatus															
Sclerolaena gardneri											x		x		
Senna ?notabilis			x					x						x	
Senna artemisioides subsp. *helmsii*				x	x							x			
Senna artemisioides subsp. *oligophylla*									x						
Senna glutinosa	x	x				x			x		x				
Sesbania cannabina													x		
Sesbania formosa														x	
Sida ?fibulifera			x												
Sida sp.									x		x				
Solanum diversiflorum															
Solanum phlomoides															
Solanum sp.															
Sporobolus actinocladus													x		
Sporobolus australasicus				x											
Stemodia grossa							x					x		x	

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY SURVEY SITE, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (DBCA 2023c, WAH 1998-); Oppo - denotes opportunistically recorded taxon

Species	Broader Investigation Areas														
	Q022	Q023	Q025	Q027	Q028	Q029	Q030	Q031	Q033	Q034	Q035	R024	R026	R032	OPPO
Stemodia sp.													x		
Streptoglossa sp.															
Stylidium fluminense														x	
Synaptantha tillaeacea var. *tillaeacea*															
Tephrosia rosea															
Tephrosea sp.															
Terminalia circumalata															
Themeda triandra	x						x					x	x		
Tinospora smilacina															x
Tribulus suberosus										x	x				
Trichodesma zeylanicum var. *zeylanicum*															
Trigastrotheca molluginea									x						
Triodia angusta							x								
Triodia brizoides		x							x		x				
Triodia epactia											x	x			
Triodia pisoliticola (P3)										x	x				
Triodia wiseana	x	x		x	x	x		x							
Triodia sp.															
Triumfetta sp.															
Typha domingensis							x					x		x	
Waltheria indica															

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY VEGETATION COMMUNITY, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (EPA 2018, WAH 1998-);
Oppo - denotes opportunistically recorded taxon

Species	C1	C2	G1	S1	OPPO
Acacia ampliceps	x	x			
Acacia ancistrocarpa		x	x	x	
Acacia arida			x	x	
Acacia bivenosa	x		x	x	
Acacia coriacea subsp. *pendens*	x	x			
Acacia inaequilatera				x	
Acacia maitlandii			x	x	
Acacia pyrifolia var. *pyrifolia*	x	x	x	x	
Acacia trachycarpa	x	x			
Acacia tumida var. *pilbarensis*		x	x	x	
**Aerva javanica*	x				
Afrohybanthus aurantiacus	x	x			
Amyema sanguinea var. *sanguinea*	x				x
Aristida contorta			x	x	
Arivela viscosa	x	x			
Asteraceae sp.			x	x	
Boerhavia gardneri		x			
Boerhavia sp.	x		x	x	
Boraginaceae sp.	x				
Brachychiton acuminatus		x		x	
Cassytha sp.	x	x	x		
**Cenchrus ciliaris*	x	x			
Cheilanthes sp.				x	
Convolvulaceae sp.	x				
Corchorus ?lasiocarpus			x	x	
Corchorus sp.	x			x	
Corymbia hamersleyana		x	x	x	
Cymbopogon ambiguus		x		x	
Cyperaceae sp.	x		x	x	
Cyperus vaginatus	x	x			
Dampiera candicans				x	
Dodonaea coriacea				x	
Ehretia saligna var. *saligna*		x			
Eleocharis geniculata		x			
Enneapogon ?lindleyanus		x			
Eragrostis elongata	x				
Eragrostis sp.	x			x	
Eriachne ciliata			x	x	
Eriachne mucronata	x	x			
Eriachne pulchella	x		x		
Eriachne sp.	x				
Eucalyptus ?camaldulensis		x			
Eucalyptus victrix	x				
Eucalyptus sp.	x	x			
Eulalia aurea	x	x			
Euphorbia sp.				x	
Euphorbia sp. 1	x				
Euphorbia sp. 2	x				
Euploca cunninghamii				x	
Evolvulus alsinoides var. *villosicalyx*				x	
Fabaceae sp.	x			x	
Ficus ?brachypoda		x			

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY VEGETATION COMMUNITY, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (EPA 2018, WAH 1998-);
Oppo - denotes opportunistically recorded taxon

Species	C1	C2	G1	S1	OPPO
Flueggea virosa subsp. *melanthesoides*		x			
Gomphrena cunninghamii	x		x	x	
?*Gomphrena* sp.				x	
Goodenia ?*lamprosperma*	x				
Goodenia sp.				x	
Goodenia stobbsiana			x		x
Goodeniaceae sp.	x			x	
Gossypium australe			x		
Grevillea pyramidalis subsp. *leucadendron*	x		x	x	
Grevillea sp.		x			
?*Grevillea* sp.	x				
Grevillea wickhamii			x	x	
Hakea chordophylla				x	
Hakea lorea			x	x	
Indigofera linifolia	x		x	x	
Indigofera monophylla	x		x	x	
Indigofera sp.			x	x	
Iseilema ?*vaginiflorum*				x	
Lobelia arnhemiaca	x	x			
Malvaceae sp.				x	
Melaleuca argentea		x			
Melaleuca glomerata	x	x			
Melaleuca linophylla	x	x			
Nellica maderaspatensis	x	x			
Panicum decompositum	x	x			
Panicum sp.	x	x			
Pentalepis trichodesmoides subsp. *hispida* (P2)					x
Pluchea sp.	x				
Poaceae sp.				x	
Polycarpaea holtzei			x	x	
Polycarpaea longiflora		x		x	
Polycarpaea sp.			x	x	
Polymeria ambigua	x			x	
Pterocaulon sphaeranthoides	x			x	
Ptilotus astrolasius			x	x	
Ptilotus calostachyus			x		
Ptilotus sp.				x	
Salsola australis				x	
Schenkia sp.	x				
Schoenoplectus subulatus		x			
Schoenus falcatus		x			
Senna artemisioides subsp. *oligophylla*				x	
Senna glutinosa		x	x	x	
Senna ?*notabilis*				x	
Sesbania cannabina	x				
Sida sp.	x		x	x	
Solanum diversiflorum	x				
Solanum phlomoides				x	
Solanum sp.		x			
Sporobolus australasicus	x			x	
Stemodia grossa	x	x			
Streptoglossa sp.	x		x	x	

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED BY VEGETATION COMMUNITY, JINBI PROJECT

Note: * denotes introduced species; P1 - P4 denotes priority taxon (EPA 2018, WAH 1998-);
Oppo - denotes opportunistically recorded taxon

Species	C1	C2	G1	S1	OPPO
Stylidium fluminense		x			
Synaptantha tillaeacea var. *tillaeacea*				x	
Tephrosia rosea	x	x	x		
Tephrosea sp.	x				
Terminalia circumalata	x	x		x	
Themeda triandra			x		
Tinospora smilacina		x			
Tribulus suberosus			x		x
Trichodesma zeylanicum var. *zeylanicum*			x		x
Trigastrotheca molluginea				x	
Triodia angusta	x				
Triodia epactia	x		x	x	
Triodia wiseana			x	x	
Triodia sp.	x				
Triumfetta sp.			x	x	
Typha domingensis	x	x			
Waltheria indica					x

APPENDIX F: SUMMARY OF VEGETATION COMMUNITIES DEFINED WITHIN THE JINBI PROJECT AREA

VEGETATION COMMUNITY DESCRIPTION			
Community Code: C1			
Community Description: *Eucalyptus victrix* low open woodland over *Melaleuca linophylla, Melaleuca glomerata, Acacia bivenosa* mid sparse shrubland over *Stemodia grossa, Cyperus vaginatus* low sparse shrubland.			
Soil and Landform:	Rocky ephemeral drainage channels	**Surface Rocks:**	Present
Outcropping:	Minor sandstone and granite outcropping	**Vegetation Condition:**	Excellent
Community Area:	98.87 ha	**Proportion of Jinbi Project Area:**	6.15%
Total No. Quadrats (Relevés):	4 (1)	**Average Quadrat Spp. Richness:**	27.5

REPRESENTATIVE PHOTOGRAPH:

Quadrat Q007

APPENDIX F: SUMMARY OF VEGETATION COMMUNITIES DEFINED WITHIN THE JINBI PROJECT AREA

VEGETATION COMMUNITY DESCRIPTION

Community Code: C2

Community Description:

Melaleuca argentea, Eucalyptus ?*camaldulensis* mid woodland over *Acacia ampliceps, Acacia coriacea* subsp. *pendens*, *Acacia pyrifolia* var. *pyrifolia* mid open shrubland over *Typha domingensis, Cyperus vaginatus, Schoenoplectus subulatus* open sedgeland.

Soil and Landform:	Brown clayey sand in gorges around permanent springs	**Surface Rocks:**	Present
Outcropping:	Sandstone	**Vegetation Condition:**	Very Good
Community Area:	3.95 ha	**Proportion of Jinbi Project Area:**	0.24%
Total No. Relevés:	2	**Average Quadrat Spp. Richness:**	N/A

REPRESENTATIVE PHOTOGRAPH:

Relevé R012

APPENDIX F: SUMMARY OF VEGETATION COMMUNITIES DEFINED WITHIN THE JINBI PROJECT AREA

VEGETATION COMMUNITY DESCRIPTION			
Community Code: G1			
Community Description: *Acacia ancistrocarpa, Acacia pyrifolia* var. *pyrifolia, Acacia bivenosa* mid sparse shrubland over *Triodia wiseana*, *Triodia epactia* low hummock grassland.			
Soil and Landform:	Red sandy clay on rugged sandstone hilltops	**Surface Rocks:**	Present
Outcropping:	Sandstone	**Vegetation Condition:**	Excellent
Community Area:	485.01 ha	**Proportion of Jinbi Project Area:**	30.18%
Total No. Quadrats:	4	**Average Quadrat Spp. Richness:**	27.5
REPRESENTATIVE PHOTOGRAPH:			

Quadrat Q016

APPENDIX F: SUMMARY OF VEGETATION COMMUNITIES DEFINED WITHIN THE JINBI PROJECT AREA

VEGETATION COMMUNITY DESCRIPTION			
Community Code: S1			
Community Description: *Corymbia hamersleyana, Terminalia circumalata* low isolated trees over *Acacia ancistrocarpa, Acacia pyrifolia* var. *pyrifolia, Acacia inaequilatera* mid sparse shrubland over *Triodia epactia, Aristida contorta* low hummock grassland.			
Soil and Landform:	Orange gravel loam on stony plains and granite tor fields	**Surface Rocks:**	Present
Outcropping:	Granite	**Vegetation Condition:**	Excellent
Community Area:	1018.92	**Proportion of Jinbi Project Area:**	63.41%
Total No. Quadrats:	10	**Average Quadrat Spp. Richness:**	16.6

REPRESENTATIVE PHOTOGRAPH:

Quadrat Q013

APPENDIX G: VEGETATION QUADRATS ESTABLISHED WITHIN THE BROADER INVESTIGATION AREA

Quadrat Reference: Q022		**Survey Date:** 2/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	494308 mE	7647727 mN	

Photograph from NW corner, facing SE corner

Topography: Valley floor	**Slope Aspect:** N/A	**Outcropping:** numerous, granite
Soils: sandy clay		**Soil Colour:** brown
Litter Types: N/A	**Litter Cover**: N/A	**Bare Ground:** 55%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Very good	
Other observations: N/A		
Vegetation Description: *Acacia tumida* var. *pilbarensis, Corymbia hamersleyana* mid sparse shrubland over *Triodia wiseana, Themeda triandra, Cymbopogon ambiguus* low open hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia pyrifolia* var. *morrisonii*	150	0.5	-
2	*Acacia tumida* var. *pilbarensis*	250	5	-
3	*Cassytha* sp.	CL	2	1
4	*Corymbia hamersleyana*	150	1	-
5	*Cymbopogon ambiguus*	100	1	-
6	*Gossypium australe*	150	0.2	-
7	*Grevillea pyramidalis* subsp. *leucadendron*	100	0.1	-
8	Poaceae sp.	50	-	0.01
9	*Senna glutinosa*	100	0.1	-
10	*Themeda triandra*	80	1	0.1
11	*Triodia wiseana*	50	30	2

Quadrat Reference: Q023		**Survey Date:** 2/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	494209 mE	7647404 mN	

Photograph from NW corner, facing SE corner

Topography: Rise/ridge	**Slope Aspect:** West	**Outcropping:** few, banded ironstone formation
Soils: clay		**Soil Colour:** orange
Litter Types: logs, twig, leaves	**Litter Cover**: 1%	**Bare Ground:** 60%
Years Since Fire: 11-20	**Disturbance (Trudgen 1988):** Excellent	
Other observations: N/A		
Vegetation Description: *Acacia tumida* var. *pilbarensis, Acacia pyrifolia* var. *morrisonii* mid sparse shrubland over *Triodia wiseana, Triodia brizoides* low open hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia pyrifolia* var. *morrisonii*	170	1	-
2	*Acacia tumida* var. *pilbarensis*	230	5	-
3	*Aristida contorta*.	8	-	0.01
4	*Boerhavia* sp.	20	0.01	-
5	*Corymbia hamersleyana*	250	0.8	-
6	Cyperaceae sp.	15	-	0.01
7	*Goodenia stobbsiana*	50	0.5	-
8	Poaceae sp.	3	-	0.01
9	*Polycarpaea* sp.	3	-	0.01
10	*Senna glutinosa*	130	0.01	-
11	*Triodia brizoides*	50	5	-
12	*Triodia wiseana*	50	35	-

Quadrat Reference: Q025		**Survey Date:** 2/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	488255 mE	7636219 mN	

Photograph from NW corner, facing SE corner

Topography: Rise/ridge	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** red
Litter Types: logs, twig, leaves	**Litter Cover**: 1%	**Bare Ground:** 60%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Very good	
Other observations: N/A		
Vegetation Description: *Hakea lorea* low isolated shrubs over *Aristida latifolia* low open tussock grassland.		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Aristida latifolia*	30	-	35
2	Asteraceae sp.	20	-	0.02
3	*Boerhavia* sp.	10	-	0.01
4	*Cynodon convergens*	15	-	0.03
5	Fabaceae sp.	5	-	0.01
6	*Hakea lorea*	50	0.02	-
7	*Iseilema ? vaginiflorum*	20	-	0.75
8	Poaceae sp.	3	-	0.01
9	*Nellica maderaspatensis*	15	0.01	-
10	*Rhynchosia* ?minima	5	-	0.01
11	*Senna ? notabilis*	50	-	0.01
12	*Sida ? fibulifera*	20	0.01	-

Quadrat Reference: Q027		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	505529 mE	7634802 mN	

Photograph from NW corner, facing SE corner

Topography: Minor drainage channel	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay		**Soil Colour:** orange/brown
Litter Types: logs, twig, leaves	**Litter Cover**: 5%	**Bare Ground:** 60%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Poor	
Other observations: Grazing		
Vegetation Description: *Acacia xiphophylla* tall open shrubland over **Cenchrus ciliaris* low sparse tussock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia coriacea* subsp. *pendens*	80	0.2	-
2	*Acacia ligulata.*	100	0.1	-
3	*Acacia xiphophylla*	250	18	0.8
4	*Atriplex* sp.	30	0.2	2
5	**Cenchrus ciliaris*	40	15	6
6	*Enchylaena tomentosa* var. *tomentosa*	50	1	0.8
7	Poaceae sp.	30	-	0.01
8	*Ptilotus exultatus*	30	0.1	0.01
9	*Salsola australis*	20	-	0.1
10	*Senna artemisioides* subsp. *helmsii*	100	0.5	-
11	*Sporobolus australasicus*	10	-	0.01
12	*Triodia wiseana*	50	2	0.1

Quadrat Reference: Q028		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	502575 mE	7634776 mN	

Photograph from NW corner, facing SE corner

Topography: Rise/ridge	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** red
Litter Types: logs, twig, leaves	**Litter Cover**: 1%	**Bare Ground:** 40%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Excellent	
Other observations: Aristida and Chrysopogon patches amongst dominant Triodia grassland		
Vegetation Description: *Acacia bivenosa, Acacia inaequilatera* mid isolated shrubs over *Triodia wiseana* low hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia bivenosa*	160	0.75	-
2	*Acacia inaequilatera*	350	0.5	-
3	*Aristida latifolia*	50	3	-
4	Asteraceae sp.	10	-	0.03
5	*Boerhavia* sp.	20	-	0.01
6	*Chrysopogon fallax*	50	-	1
7	*Eulalia aurea*	50	0.2	-
8	Fabaceae sp.	10	-	0.01
9	Malvaceae sp.	10	-	0.01
10	*Panicum decompositum*	50	-	0.02
11	*Rhynchosia minima*	20	-	0.01
12	*Senna artemisioidea* subsp. *helmsii*	180	0.15	-
13	*Triodia wiseana*	40	55	-

Quadrat Reference: Q029		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	505364 mE	7634448 mN	

Photograph from NW corner, facing SE corner

Topography: Flat	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: sandy loam		**Soil Colour:** brown
Litter Types: logs, twig, leaves	**Litter Cover**: 1%	**Bare Ground:** 60%
Years Since Fire: 11-20	**Disturbance (Trudgen 1988):** Very good	
Other observations: N/A		
Vegetation Description: *Acacia inaequilatera, Corymbia hamersleyana* mid sparse shrubland over *Triodia wiseana* low open hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia inaequilatera*	180	6	-
2	*Boerhavia* sp.	10	-	0.01
3	**Cenchrus ciliaris*	30	0.8	-
4	*Corymbia hamersleyana*	300	-	0.75
5	*Indigofera linifolia.*	20	-	0.03
6	*Ixiochlamys cuneifolia*	20	0.01	0.05
7	*Salsola australis*	50	-	0.2
8	*Senna glutinosa*	120	0.1	0.01
9	*Triodia wiseana*	50	40	-

Quadrat Reference: Q030		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	498085 mE	7630055 mN	

Photograph from NW corner, facing SE corner

Topography: Major drainage channel	**Slope Aspect:** South	**Outcropping:** N/A
Soils: sandy loam		**Soil Colour:** N/A
Litter Types: logs, twig, leaves	**Litter Cover**: 60%	**Bare Ground:** 10%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Good	
Other observations: N/A		
Vegetation Description: *Eucalyptus camaldulensis* low woodland over *Acacia ampliceps, Melaleuca glomerata, Acacia coriacea* subsp. *pendens* tall sparse shrubland over *Heteropogon contortus, *Cenchrus ciliaris, Triodia angusta* low sparse tussock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia ampliceps*	220	5	-
2	*Acacia coriacea* subsp. *pendens*	270	3	-
3	*Acacia trachycarpa*	180	1	-
4	*Arivela viscosa*	40	-	0.01
5	*Boerhavia* sp.	3	0.01	-
6	**Cenchrus ciliaris*	30	2	-
7	**Chloris barbata*	50	0.5	-
8	Convolvulaceae sp.	CR	0.01	-
9	*Cymbopogon ambiguus*	40	0.1	-
10	*Cyperus vaginatus*	50	1.5	-
11	*Enneapogon caerulescens*	30	-	0.01
12	*Eriachne* sp.	60	0.5	-
13	*Eucalyptus camaldulensis*	900	50	-
14	*Eulalia aurea*	50	0.8	-
15	*Evolvulus alsinoides* var. *villosicalyx*	10	0.01	-
16	*Heteropogon contortus*	60	3	-

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
17	*Marsilea hirsuta*	5	0.01	0.01
18	*Melaleuca glomerata*	200	7	-
19	*Panicum decompositum*	50	0.3	-
20	*Pluchea rubelliflora*	40	0.4	-
21	Poaceae sp.	10	0.5	-
22	*Schoenoplectus subulatus*	40	-	0.02
23	*Stemodia grossa*	60	0.1	-
24	*Themeda triandra*	50	0.1	-
25	*Triodia angusta*	30	0.8	-
26	*Typha domingensis*	200	-	2

Quadrat Reference: Q031		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	498295 mE	7629741 mN	

Photograph from NW corner, facing SE corner

Topography: Rise/ridge	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** red
Litter Types: logs, twig, leaves	**Litter Cover**: 20%	**Bare Ground:** 40%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Very good	
Other observations: N/A		
Vegetation Description: *Aristida latifolia* low open tussock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Aristida contorta*	30	-	0.8
2	*Aristida latifolia*	50	-	20
3	*Arivela viscosa*	10	-	0.01
4	Asteraceae sp.	40	-	3
5	*Boerhavia* sp.	10	0.01	0.01
6	*Chrysopogon* sp.	80	-	0.3
7	*Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)	10	-	0.01
8	*Enneapogon caerulescens*	10	-	0.01
9	*Eragrostis xerophila*	30	-	1.5
10	Fabaceae sp.	40	-	0.1
11	*Indigofera linifolia*	10	-	0.01
12	*Neptunia* sp.	5	-	0.1
13	*Ptilotus exaltatus*	10	0.01	0.01
14	*Senna ? notabilis*	60	0.5	1
15	*Triodia wiseana*	30	0.1	-

Quadrat Reference: Q033		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	497097 mE		7622749 mN

Photograph from NW corner, facing SE corner

Topography: Mid slope	**Slope Aspect:** South West	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** red
Litter Types: logs, twig, leaves	**Litter Cover**: 5%	**Bare Ground:** 50%
Years Since Fire: 11-20	**Disturbance (Trudgen 1988):** Excellent	
Other observations: N/A		
Vegetation Description: *Eucalyptus leucophloia* subsp. *leucophloia, Corymbia hamersleyana* mid open mallee woodland over *Eremophila fraseri subsp. parva, Acacia acradenia, Senna glutinosa* mid sparse shrubland over *Triodia brizoides* low open hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia acradenia*	150	0.8	-
2	*Acacia maitlandii*	150	0.02	-
3	*Acacia pyrifolia* var. *pyrifolia*	150	0.1	-
4	*Acacia ?sibirica*	100	0.02	-
5	*Corchorus sp.*	50	0.01	-
6	*Corymbia hamersleyana*	200	1	-
7	*Cymbopogon ambiguus*	40	0.03	-
8	Cyperaceae sp.	10	-	0.02
9	*Eremophila fraseri subsp. parva*	100	1.5	-
10	*Eriachne mucronata*	30	0.02	-
11	*Eucalyptus leucophloia* subsp. *leucophloia*	300	6	1
12	*Goodenia stobbsiana*	50	0.02	-
13	Goodeniaceae sp.	10	-	0.01
14	*Indigofera monophylla*	30	0.01	0.01
15	*Polycarpaea holtzei*	5	-	0.0.1
16	*Ptilotus astrolasius*	40	0.01	-

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
17	*Ptilotus calostachyus*	100	0.02	0.01
18	*Senna artemisioides* subsp. *oligophylla*	80	0.01	-
19	*Senna glutinosa*	50	1	-
20	*Sida* sp.	50	0.01	-
21	*Trigastrotheca molluginea*	10	-	0.01
22	*Triodia brizoides*	40	30	10

Quadrat Reference: Q034		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	496686 mE	7619464 mN	

Photograph from NW corner, facing SE corner

Topography: Rise/ridge	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay		**Soil Colour:** orange
Litter Types: logs, twig, leaves	**Litter Cover**: 1%	**Bare Ground:** 70%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Excellent	
Other observations: N/A		
Vegetation Description: *Grevillea berryana, Eucalyptus leucophloia* subsp. *leucophloia* tall sparse shrubland over *Triodia pisoliticola* (P3) tall open hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia ?sibirica*	180	4	-
2	*Dolichocarpa crouchiana*	30	-	0.01
3	*Eucalyptus leucophloia* subsp. *leucophloia*	250	1	-
4	*Goodenia stobbsiana*	40	0.3	-
5	*Grevillea berryana*	200	8	-
6	*Tribulus suberosus*	50	0.1	-
7	*Triodia pisoliticola* (P3)	60	30	-

Quadrat Reference: Q035		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	496681 mE	7619193 mN	

Photograph from NW corner, facing SE corner

Topography: Lower slope/Minor drainage channel	**Slope Aspect:** West	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** cream
Litter Types: logs, twig, leaves	**Litter Cover**: 10%	**Bare Ground:** 60%
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Excellent	
Other observations: N/A		
Vegetation Description: *Acacia tumida* var. *pilbarensis, Eucalyptus victrix, Acacia* ?*sibirica* tall open shrubland over *Triodia brizoides, Triodia epactia, Triodia pisoliticola* (P3) mid open hummock grassland		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia acradenia*	80	0.1	-
2	*Acacia bivenosa*	50	0.01	-
3	*Acacia maitlandii*	150	1	-
4	*Acacia pyrifolia* var. *pyrifolia*	150	0.1	-
5	*Acacia* ?*sibirica*	150	10	-
6	*Acacia tumida* var. *pilbarensis*	220	15	1
7	*Eucalyptus victrix*	300	8	-
8	*Euploca ovalifolia*	40	0.1	-
9	*Goodenia stobbsiana*	50	-	0.01
10	*Grevillea wickhamii*	200	0.01	-
11	*Gyrostemon* sp.	200	0.01	0.1
12	*Indigofera monophylla*	50	0.01	0.01
13	*Lepidium pedicellosum*	80	0.1	-
14	*Ptilotus astrolasius*	40	0.01	0.01
15	*Ptilotus calostachyus*	60	0.1	-
16	*Ptilotus exaltatus*	10	0.01	0.01

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
17	*Sclerolaena gardneri*	10	0.1	-
18	*Senna glutinosa*	100	0.05	-
19	*Sida* sp.	80	0.01	-
20	*Tribulus suberosus*	150	0.2	-
21	*Triodia brizoides*	40	20	2
22	*Triodia epactia*	50	8	0.1
23	*Triodia pisoliticola* (P3)	80	6	-

Quadrat Reference: R024		**Survey Date:** 2/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	484730 mE	7636514 mN	

Photograph from NW corner, facing SE corner

Topography: Major drainage channel	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: N/A		**Soil Colour:** N/A
Litter Types: logs, twig, leaves	**Litter Cover**: N/A	**Bare Ground:** N/A
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Very good	
Other observations: Grazing		
Vegetation Description: N/A		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia ampliceps*	-	-	-
2	*Acacia bivenosa*	-	-	-
3	*Acacia coriacea* subsp. *pendens*	-	-	-
4	*Acacia pyrifolia* var. *pyrifolia*	-	-	-
5	*Afrohybanthus aurantiacus*	-	-	-
6	*Cassytha* sp.	-	-	-
7	*Cymbopogon ambiguus*	-	-	-
8	*Cyperus vaginatus*	-	-	-
9	*Eucalyptus victrix*	-	-	-
10	*Eulalia aurea*	-	-	-
11	*Euphorbia careyi*	-	-	-
12	*Gossypium australe*	-	-	-
13	*Gossypium robinsonii*	-	-	-
14	*Ipomoea* sp.	-	-	-
15	*Melaleuca glomerata*	-	-	-
16	*Panicum* sp.	-	-	-
11	*Potamogeton ?tepperi*	-	-	-
18	*Senna artemisioides* subsp. *helmsii*	-	-	-

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
19	*Stemodia grossa*	-	-	-
20	*Themeda triandra*	-	-	-
21	*Triodia epactia*	-	-	-
22	*Typha domingensis*	-	-	-

Quadrat Reference: R026		**Survey Date:** 3/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	502465 mE	7634838 mN	

Photograph from NW corner, facing SE corner

Topography: Flat	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** brown
Litter Types: logs, twig, leaves	**Litter Cover**: N/A	**Bare Ground:** N/A
Years Since Fire: 6-10	**Disturbance (Trudgen 1988):** Good	
Other observations: Grazing		
Vegetation Description: N/A		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Acacia bivenosa*	120	-	-
2	*Acacia inaequilatera*	200	-	-
3	*Alternanthera nodiflora*	40	-	-
4	*Cassytha* sp.	CL	-	-
5	**Cenchrus ciliaris*	40	-	-
6	*Corchorus* sp.	80	-	-
7	*Cucumis* sp.	CR	-	-
8	*Cyperus vaginatus*	80	-	-
9	*Diplachne fusca* subsp. *fusca*	10	-	-
10	*Erythrina vespertilio*	220	-	-
11	*Glinus lotoides*	10	-	-
12	*Grevillea pyramidalis* subsp. *leucadendron*	150	-	-
13	*Jasminum didymum* subsp. *lineare*	150	-	-
14	*Nellica maderaspatensis*	30	-	-
15	*Panicum decompositum*	100	-	-
16	*Panicum* sp.	100	-	-
17	*Pluchea* sp.	30	-	-
18	*Rhynchosia minima*	CR	-	-

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
19	*Sclerolaena gardneri*	15	-	-
20	*Sesbania cannabina*	150	-	-
21	*Sporobolus actinocladus*	10	-	-
22	*Stemodia* sp.	40	-	-
23	*Themeda triandra*	60	-	-

Quadrat Reference: R032		**Survey Date:** 2/11/2023	
NW Corner Coordinates (GDA94, Zone 50):	481320 mE	7625419 mN	

Photograph from NW corner, facing SE corner

Topography: Major drainage channel	**Slope Aspect:** N/A	**Outcropping:** N/A
Soils: clay loam		**Soil Colour:** dark brown
Litter Types: logs, twig, leaves	**Litter Cover**: N/A	**Bare Ground:** N/A
Years Since Fire: 11-20	**Disturbance (Trudgen 1988):** Good	
Other observations: Grazing		
Vegetation Description: N/A		

	Taxon	Height (cm)	% Cover (Alive)	% Cover (Dead)
1	*Cyperus vaginatus*	-	-	-
2	*Eleocharis geniculata*	-	-	-
3	*Eriachne mucronata*	-	-	-
4	*Eucalyptus victrix*	-	-	-
5	*Fimbristylis ferruginea*	-	-	-
6	*Melaleuca argentea*	-	-	-
7	*Melaleuca glomerata*	-	-	-
	* *Parkinsonia aculeata*	-	-	-
	Peplidium sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768)	-	-	-
	Pluchea sp.	-	-	-
	Potamogeton ? tepperi	-	-	-
	Samolus sp. Millstream (M.I.H. Brooker 2076)	-	-	-
	Senna ? notabilis	-	-	-
	Sesbania formosa	-	-	-
	Stemodia grossa	-	-	-
	Stylidium fluminense	-	-	-
	Typha domingensis	-	-	-